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COMPUTERWORLD

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3090 booster due in early 1988

F models to include 20% plus price/performance lift, enhanced MVS/XA

BY JAMES CONNOLLY
CW STAFF

IBM's 3090 mainframes will receive a second kicker in early 1988 as IBM plans F models with new features, including an upgraded version of MVS/XA and at least 20% better price/performance than the 3090E models introduced only 11 months ago, according to industry observers.

The move is seen by analysts as one more attempt to stimulate 3090 sales, which reportedly have been successful in shipment numbers but have not made up for shortfalls in other areas.

A survey of IBM watchers — analysts who based their predictions on what IBM told them as well as on analysis of market trends — last week revealed a consensus that IBM will introduce enhanced 3090s.

The observers estimated that price/performance gains will range from 20% to 30% in comparison with the E models introduced last January.

Most of the analysts said they expect the announcement in January or February, with delivery a few months later, and expect field upgrades from existing 3090 models. Such upgrades would differ from the E series migration plan, under which IBM discouraged moves between comparable systems — for example, from a Model 400 to a Model 400E.

The key differences in the predictions centered on which features IBM will add, but the

Continued on page 6

Main component

Large-system CPU and software sales generated almost $11 billion in gross profit (revenue minus cost of manufacturing) in 1986 — more than one-third of total gross from all operations

CPU class	*Revenue (billions of dollars)*	*Gross profit (billions of dollars)*	*Gross margin*
Large systems (includes 3090 and 3080 series)			
Hardware	10.8	8.3	77%
Software	3.4	2.6	77%
Mid-range (includes 4300 and System/34, 36, 38)			
Hardware	3.7	2	55%
Software	1.6	1	67%
All personal computers			
Hardware	4.9	1	21%
Software	0.5	0.3	59%

INFORMATION PROVIDED BY ANNEX RESEARCH
CW CHART

Quiet test for IBM Cobol 85

BY CHARLES BABCOCK
CW STAFF

An IBM mainframe Cobol compiler has been secretly tested by a U.S. agency for compliance with ANSI standards for Cobol 85, *Computerworld* learned last week.

Although IBM's compiler has not appeared on a public list of Cobol compilers submitted for compliance with the updated standard, the National Bureau of Standards acceded to a company request to test a version without public disclosure. Government regulations required compilers to be scheduled for compliance testing by Oct. 1 in order to be eligible for government contracts.

Cobol consultants said that the current version of IBM's VS Cobol II, released two years ago, comes close to meeting the standard but is lacking in key areas.

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LAN 1-2-3 finally here

BY ED SCANNELL
and ALAN J. RYAN
CW STAFF

CAMBRIDGE, Mass. — Lotus Development Corp. last week released its long-overdue 1-2-3 Networker multiuser application, which enables up to five users to share 1-2-3 programs and files. The product is set to ship within two weeks.

Originally slated for delivery last March, 1-2-3 Networker resides on a file server and eliminates the need for key diskettes

Continued on page 113

TORCHBEARERS

MIS goes for Olympic gold

BY KATHY CHIN LEONG
CW STAFF

Few MIS installations require flying to Sarajevo, Yugoslavia. Disassembling a $23 million computer system after 16 days of actual use is not common, either.

Yet that is typical for the 60-member group of MIS and telecommunications personnel who are putting the finishing touches on the computer and communications networks for the 15th Winter Olympic Games, to be held in Calgary, Alberta, in February.

While 2,600 athletes will face the challenges of their lives, the MIS team will likewise be put to the test as systems chart everything from contest scores to the number of cups of hot chocolate sold during the Games.

The 100-mile network will stretch across the city to the 25 main sports venues and out to the offices and Olympic dorms. Hardware includes IBM 3081 Model GX and 4381 mainframes, 13 Northern Telecom, Inc. SL-1 private branch exchanges, 6,000 telephones, more than 100 IBM Personal Computers and compatibles, at least 650 ASCII terminals, 200 IBM 3270-type terminals, one Intergraph Corp. turnkey minicomputer and 220 printers.

"I guess I feel reasonably comfortable with how everything has worked out," said John Russell, the Olympic Committee's vice-president of systems. "Now we have to roll these systems out to the sites."

Assembling a technical team and designing a system from scratch at the same time is an unusual MIS feat. After all, it is not every day that one gets the responsibility of tracking a historic event.

The planning for February's Olympic Games started nearly four years ago. In February 1984, Russell and his systems team met with their Olympic MIS predecessors in Sarajevo to discuss the mammoth requirements of pulling off such an event.

"We spent the first year learning and observing and taking notes from these people to

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NEWSPAPER
SECOND CLASS

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Taking aim. Javelin plans to ring in the new year with a series of products, including a programming language, an add-in tool for Javelin users to view 1-2-3 spreadsheets and a securities analysis template. Page 4.

Planning ahead. In an effort to meet needs of early adopters of Microsoft's MS OS/2, Oracle readies Oracle Version 5.1, which provides multitasking and includes a 1-2-3-like spreadsheet. Page 29.

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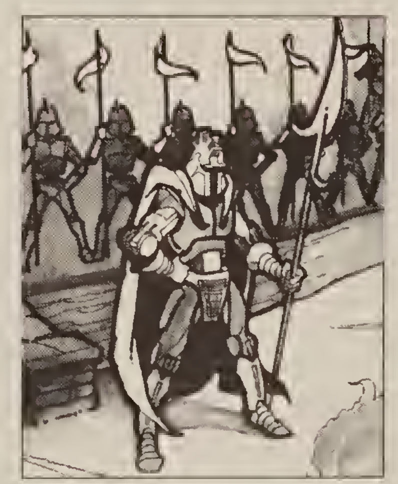

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Quotable

"It's been a lot of work. When the closing ceremonies come, we are going to stand there and feel real damn good about it all."

NICK LUNDHILD
TELECOM MANAGER
15TH WINTER
OLYMPIC GAMES

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NTIA: Bypass Greene

Urges FCC to scrap judge's info services ruling

BY MITCH BETTS
CW STAFF

WASHINGTON, D.C. — Reagan administration officials are urging the Federal Communications Commission to bypass U.S. District Judge Harold H. Greene and authorize the regional Bell holding companies to offer information services that Greene has prohibited.

The official recommendation was made last week by the National Telecommunications and Information Administration (NTIA), part of the U.S. Department of Commerce.

In essence, the NTIA argued that the FCC's legal authority to regulate the communications industry in the public interest should take precedence over Greene's antitrust decision, which bars the Bell companies from offering information-content services [CW, Sept. 14].

FCC officials opposed Greene's ruling but had no immediate comment on the NTIA's petition for a declaratory ruling.

Addressing the policy differences between the FCC and Greene, the NTIA petition said "the conflict is irreconcilable and must be resolved in favor of the commission."

NTIA Administrator Alfred C. Sikes said Greene's continuing involvement in national communications policy is "a judicial bottleneck" that is blocking the development of information services and is not sanctioned by law.

The NTIA urged the FCC, under authority of the Communications Act of 1934, to declare that the Bell companies may offer information services.

CDC's Norris beseeches feds to help stem takeover mania

BY STANLEY GIBSON
CW STAFF

William C. Norris

BOSTON — The stock market crash may have shocked the nations' lawmakers into reducing the federal deficit, but they must act to stop takeover mania as well, according to William C. Norris, the legendary founder and now chairman emeritus of Control Data Corp.

A year and a half after handing over CDC leadership responsibilities to Robert Price, 76-year-old Norris travels the country preaching the gospel of public-private consortia, equitable trade with the Japanese, better research and efficient manufacturing. He also counsels about the debilitating effects of hostile takeovers on American industry, long a Norris theme.

"I have the feeling that I told you so. But there's no pleasure in it. That's just reality. Hostile takeovers are a large factor that caused the crash," he says.

"Risk arbitrage is nothing but speculation. It adds no productivity, and the stress that management goes through is unproductive," Norris says.

Although he credits moves to reduce the budget deficit as worthwhile, Norris is dismayed by the desire of many in leadership roles to bury Black Monday in the past. "People want to shrug it off," he says.

Criticizes ignorance

And to those who would seek to ignore hostile takeovers as an underlying cause, he adds, "It is irresponsible on the part of the private sector to do it. It is irresponsible on the part of government to let it go on so long."

Norris scoffs at those who look to the dollar's current value, which fell in the wake of the crash, to reverse America's trade deficit. "The change in the dollar's value just treats the symptoms. The root cause is America's lack of competitiveness," Norris says.

He is unabashedly critical of the Japanese for profiting from America's open markets while keeping their own closed. He recently testified before a Senate subcommittee, calling for a change in Japanese behavior. "America has been providing Japan with virtually unlimited access to our technologies. . . . This 'one-way street' syndrome must stop," he said in his testimony.

But even with the change in the value of the dollar and the softening of Japanese intransigence, America must change its own outlook, identifying technology and manufacturing excellence with its national interest.

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Javelin plans rollouts despite cash setback

BY ED SCANNELL
CW STAFF

CAMBRIDGE, Mass. — Despite cash flow problems from the recent delay of its public stock offering, Javelin Software Corp. said last week it plans to ship in the next two months a series of products, including a language that allows users to link the company's Javelin financial modeling package to data bases.

Sources speculated that the company was having serious cash flow problems and was having difficulty meeting payments to creditors. Rob Firmin, the company's chairman, said the speculation was untrue.

"We certainly have been careful in controlling our cash flow, because all our plans were predicated on this financing" Firmin said, referring to the public offering. "But statements that we aren't making any more payments to developers are just untrue."

Image construction

The company's Javelin product is a financial modeling and analysis tool that puts a user's financial model into a variety of forms, each of which is appropriate at a different time during the analysis process. It allows users to construct their own images of business issues and relate their work to that of others within their companies.

The delayed public offering will not affect the company's plans to ship a series of new products during the next two or three months, including a programming language and an add-in tool that allows Javelin users to view a Lotus Development Corp. 1-2-3 spreadsheet from within Javelin.

Javtalk is a package that contains a programming language and a compiler that allow users to write add-in programs. The program, developed by Chesterbrook Associates, will cost $299 and will be available in the first quarter of next year.

1-2-3 Import allows users not only to view a 1-2-3 spreadsheet from within Javelin but also to specify a cell range to import by anchoring the cursor in the Lotus spreadsheet. The product would be best used in a networking environment in which there are multiple Lotus users, according to a company spokesman. The program will cost $99.95 and is expected to be delivered next month.

A third product is called Marketlink and lets Javelin users download financial securities data from Dow Jones News/Retrieval Service directly into Javelin. Marketlink will cost $99.95 and is expected to be available in January.

Other new products include Asset, a $149 securities analysis template; Simple Accountant, a general ledger template priced at $99.95; and Loan Amortization, a program that makes it easy to calculate bond retirement or mortgage payments, priced at $49.95 and set to be available in January.

Cash infusion

The company is also looking to release a series of analysis and presentation applications next year that would complement Javelin. How quickly the company delivers those applications will depend, however, on a cash infusion.

"We would have liked to have had that money [from the public offering]. We could put it to great use, accelerating our development plans," Firmin said.

In lieu of the public offering, Javelin is talking with several private investors who have expressed interest in the software company, Firmin said. He added that it would be two weeks before the investors, none of whom currently has a stake in the company, would know if they were interested.

"We had a board meeting to discuss what our financing options are in this unstable [economic] environment. We don't know how it will turn out, but I'm sure it will be for the better," Firmin said.

Major financial backers of the company include Hambrecht & Quist, Inc.'s venture capital division based in San Francisco. Javelin has had three rounds of financing totaling $4.1 million. The last round was for $1.1 million in late 1985.

To date, Javelin has sold more than 50,000 copies of its financial modeling program, 15,000 of which were sold overseas. The product was introduced in the fall of 1985 and was hyped as the product that would give Lotus's 1-2-3 a serious challenge.

That challenge never materialized, however, with the company having sold approximately 15,000 copies of the program within a year after it was released. In August 1986, the company laid off 13 employees, or 30% of its work force, because sales were slower than expected.

Last fall, the company reduced Javelin's price to $99.95 from $695 as part of a temporary pricing promotion. After it sold approximately 20,000 copies, the company raised the price to $199.95.

ETA called fastest super

Argonne lab hands crown to ETA-10 Model E

BY JEAN S. BOZMAN
CW STAFF

MINNEAPOLIS — ETA Systems, Inc.'s ETA-10 Model E supercomputer emerged earlier this month as the winner in the Argonne National Laboratory's rating of the world's fastest supercomputers. It was the first time an ETA system has been included in the laboratory's list, which is updated as new performance information becomes available.

In a report now circulating among the supercomputer vendors, the ETA-10 supercomputer was rated as performing at 52 million floating-point operations per second (MFLOPS) while running a set of scientific equations — known as the Linpack linear equations — in Fortran. The Linpack benchmark has been used by Argonne's mathematics and computer science department to rate supercomputers since 1979.

The ETA-10 Model E, a production machine installed at the West German weather service and at Florida State University, is cooled by liquid nitrogen, which boosts system performance to twice that of other air-cooled ETA-10 models.

The Florida State computer was shipped last December. By year's end, ETA said it will have shipped 23 CPUs packaged in a smaller number of systems. As of last week, there were four ETA installations worldwide.

The competition

The nearest competitors that were listed in the Argonne report were the NEC Corp. SX-2 at 43 MFLOPS, the Cray Research, Inc. X-MP-4 at 39 MFLOPS, the National Advanced Systems Corp. (NAS) AS/XL V60 at 21 MFLOPS, the Amdahl Corp. 1200 at 18 MFLOPS and the IBM 3090 Model 200 uniprocessor with Vector Facility at 12 MFLOPS.

The Argonne list, which is recompiled by Jack Dongarra of Argonne's Mathematics and Computer Science Division, is supported by funds from the Federal Office of Energy Research. The report naming the ETA-10 Model E as the fastest computer, dated Oct. 27, also rated the smaller, air-cooled ETA-10 Model P at 23 MFLOPS.

The list has valid uses, but its inventor, Dongarra, has reservations about its applications to marketing. "This benchmark wasn't intended to be used as a standard for comparing different machines," he maintained. "It was intended to help a person pick a machine to solve linear equations with full precision."

Dongarra said he believes the Linpack list "is often misused and misunderstood" from a marketing perspective. "As with any benchmark, it should be used in conjunction with other things. Users really have to look at the applications they're going to run and at how similar they are to the Linpack equations." The ETA machine was tested while running under ANSI-standard Fortran 77.

ETA CEO Carl Ledbetter

Carl Ledbetter, recently promoted to chief executive officer at ETA, said last week that the statistics proved ETA's highly modular and compact design had significantly altered the price/performance curve of supercomputers.

"For the first time, a true Class 6 [as measured by the Department of Energy] supercomputer can be had for less than $1 million," he said, referring to the ETA-10 Model P. The Model P is priced at $850,000 for the CPU only; the liquid nitrogen-cooled Model E CPU is priced at $5.5 million.

Comparing the utility of an ETA supercomputer with that of IBM's Linpack entry, the 3090 with Vector Facility, Ledbetter said that ETA's solution was intended to resolve problems that lend themselves to vectorization.

'A thoroughbred'

"A supercomputer is a thoroughbred," Ledbetter said. "It isn't intended for workhorse scalar applications." IBM's solution is a hybrid between a scalar CPU and a series of attached vector CPUs.

NAS, which did well in the Linpack competition, still has a limited market acceptance among large corporate customers for true supercomputer architecture.

"Many engineering applications are still being written in scalar," said company spokesman Charles Malloy. "Even now, there aren't many applications yet written for an integrated vector processor, such as ours or IBM's. We're working with our customers to develop more vector/scalar integrated applications."

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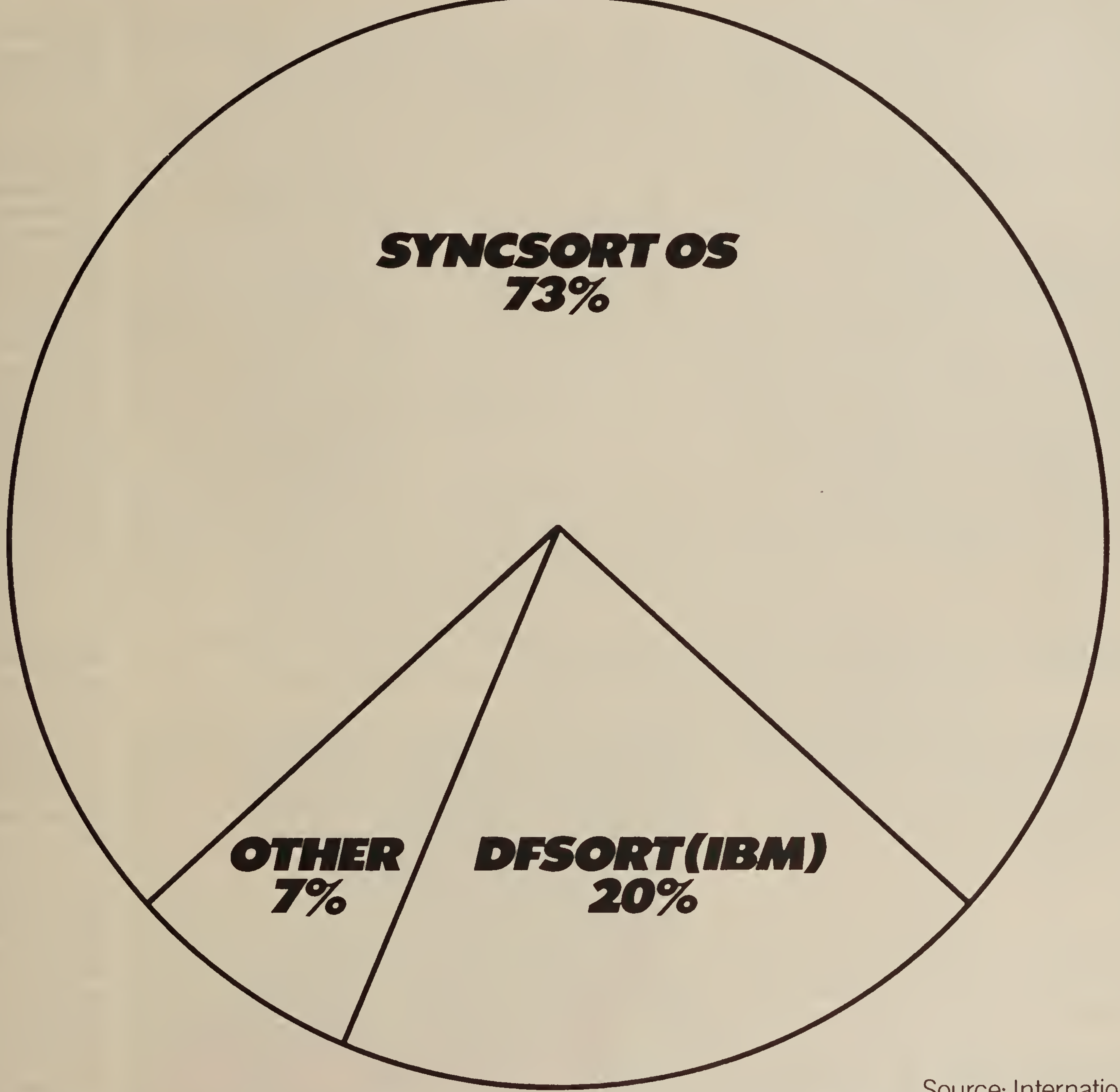

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High-end future seen for Silverlake

BY ALAN ALPER
CW STAFF

SECAUCUS, N.J. — IBM's Silverlake, the long-awaited family of mid-range processors bridging the System/36 and 38 product lines, reportedly will range up to a high-end model as powerful as IBM's 3090 Model 200 by the early 1990s.

This is the optimistic projection of David Andrews, president of the Cheshire, Conn., consulting firm ADM, Inc. Andrews, like other IBM watchers, expects Silverlake to finally bow in the March-April time frame and begin shipping sometime during the third quarter next year.

Andrews, who presented his vision of the product at a seminar sponsored by System/38 application software developer J. D. Edwards & Co. here last week, said Silverlake should resolve capacity concerns of System/36 and 38 users.

By the early 1990s, Andrews said, he expects the high-end Silverlake to offer 1G byte of main memory and the capability to handle up to 2,000 workstations. Such a system could be implemented as a multiprocessor, akin to Digital Equipment Corp.'s Vaxcluster concept.

"IBM is no longer asking Rochester [its New York-based development facility for mid-range systems] to hold one hand behind its back and produce a limited-power machine," Andrews noted. "Silverlake will solve a blatant weakness and allow IBM to be a true competitor with DEC in the mid-range."

Two branches

Initially, Andrews said, he expects IBM to introduce two main models of Silverlake — each with a number of submodels — packaged in a rack-mount similar to the one used with IBM's 9370. He said Silverlake initially will accommodate up to 64M bytes of main memory, offered in 8M-byte increments

The low-end product will feature a reduced instruction set computing architecture and will optimally support 20 to 100 workstations, Andrews said.

The high-end model, he predicted, will support up to 600 workstations and have ports for 24 communications lines. It will offer two to three times the performance of the existing high-end System/38 Model 700, Andrews said. The recently introduced System/36 Model 5363 will continue to be the entry-level model into the System/36 and 38 family, he added.

Cobol 85

FROM PAGE 1

IBM spokesman John H. Mihalec acknowledged that VS Cobol II is the product with which IBM plans to meet the Cobol 85 standard.

An IBM executive who asked not to be identified confirmed that IBM recently requested the NBS test of a mainframe compiler and that the test has taken place.

"IBM didn't want to announce the product through a National Bureau of Standards legal publication. We don't preannounce products," the official said. The NBS list of scheduled tests was published Oct. 1.

NBS spokesmen said the results of the test are likely to be made public in mid-December.

The Institute of Computer Science and Technology within the NBS tests compilers for compliance with the Cobol 85 standard, and a spokesman for the institute acknowledged that IBM does not appear on the public list of vendors whose compilers have been tested or are slated to be tested between now and September 1988.

Appearing on the public list was a requirement for all other vendors bidding on government contracts after Oct. 1. The NBS published a directive in March 1986 that all vendors doing business with the federal government either have a validated Cobol 85 compiler or be scheduled for testing by Oct. 1, 1987.

Not meeting the deadline would have made IBM ineligible for bidding on government contracts.

Mihalec said that IBM has continued as an active bidder even though it did not appear to meet the NBS requirement.

Jerome Garfunkel, a Cobol consultant in Litchfield, Conn., and author of *The Cobol 85 Example Book,* questioned why it was necessary for the NBS to grant one vendor a secret validation test. "IBM was not on the published list, and that has affected my advice to clients on Cobol 85," he said.

> "IBM WAS NOT on the published list, and that has affected my advice to clients on Cobol 85."
>
> JEROME GARFUNKEL
> CONSULTANT

Garfunkel said VS Cobol II lacks the nested program feature of Cobol 85 that would allow a programmer to develop independent subprograms, which would be called in as needed when the main program runs.

When asked about IBM's absence from the published list, Mabel V. Vickers, staff programming language adviser to NBS, said, "I haven't heard a word from IBM. If they want to be tested, we would attempt to accommodate them, but it would take three to four months for them to get on the schedule."

Given IBM's absence from the list, users of its VS Cobol II product faced a difficult choice, Cobol experts said. Switching applications written in products that followed the Cobol 65, 68 or 74 standards to VS Cobol II requires a conversion. Those who undertook the conversion were faced with the prospect of still being unsure of when they would have a compiler that met the ANSI standard.

Cobol is used extensively throughout the federal government. A study in the mid-1970s found that 60% to 70% of all general-purpose language use consisted of Cobol, Vickers said.

IBM recognized Cobol 85 as a standard in its Systems Application Architecture announcement, Mihalec said.

VS Cobol II is the only IBM Cobol compiler available that allows IBM MVS/XA users to recompile their applications to run as 31-bit programs or above the 16M-byte virtual memory constraint of 24-bit programs.

3090 booster

FROM PAGE 1

most commonly cited functional additions include the following:

- A version of MVS/XA featuring 38- or 46-bit addressing in place of 31-bit addressing and enhancements to take advantage of expanded storage and improve performance of IBM's DB2, IMS and CICS.
- A new I/O processor and fiber-optic channels supporting 6M byte/sec. serial transfer rates to the IBM 3990 storage controller in place of the current 4.5M byte/sec.
- A five-CPU 3090 to fit between the four-CPU 3090 Model 400E and six-processor 3090 Model 600E.

Analysts said IBM needs to continue to differentiate the 3090s from the older 3080s by offering functional advantages, such as support for a new MVS/XA, and thus spur 3090 sales to cover profit shortfalls in the IBM mid-range and personal computer lines.

Bob Djurdjevic, president of Annex Research in Phoenix, said, "We expect the F models in early 1988, probably the January or February time frame, with January more likely. IBM has raised user expectations to the 25% price/performance level."

But Djurdjevic questioned how much of that gain can be done without price cuts. "I don't think IBM would be able to do that on performance alone, so there is going to have to be some price adjustment as well," he said.

He claimed that even matching the 7% cycle time improvement of the E models will not be an easy task.

Djurdjevic is among the observers expecting a new version of MVS/XA, what some people call MVS/XB, to be announced in conjunction with the F models.

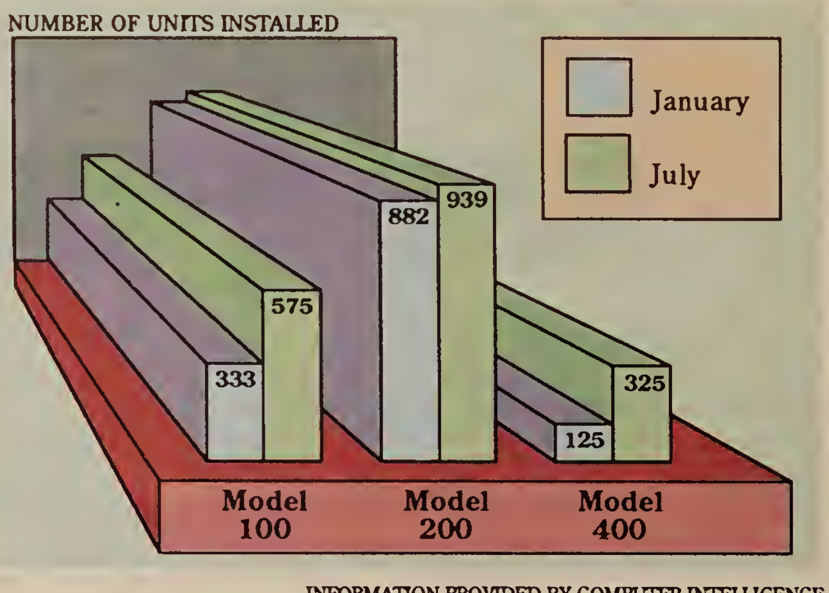
However, he warned that a new operating system announced in early 1988 may not be available until 1989 and that user implementation should be slow. He said MVS/XA took four years to appear at half of IBM's customer sites.

Support for the future

Analyst Rick Martin of the New York investment firm Sanford C. Bernstein & Co. also expects a new MVS/XA, this time with 46-bit addressing. But he noted that the new version, like MVS/XA before it, will include support for features that may appear in future generations of systems. He said that as MVS/XA supported IBM's expanded storage feature and increased parallelism, the new version may support high-speed interfaces, special-purpose processors now under development and up to 16 CPUs, twice the technical limit of MVS/XA.

Installed iron

Estimates of 3090s installed in U.S. indicates growth in model lines from January to July



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CW CHART

Martin predicted a 30% performance boost with a slight increase in price for F models. He expects a first-quarter announcement because he said he believes IBM will largely exhaust its backlog for E model orders by the end of this year. "Coming from the position of a former IBM product manager, I assume that when the backlog goes, it's time for a new machine," said Martin, a former IBM 4381 product manager.

He was among the analysts expecting early F model shipments, possibly by summer. But several analysts projected later availabilities.

"The original plan was to announce the F models in the second quarter, but IBM has been getting pressure to move them out. So what was planned for the second quarter may creep up to the first. But I still don't think they can deliver until the third quarter," said analyst Francis Gens of Framingham, Mass.-based market research firm International Data Corp. Gens said talk of new models has caused some users to delay 3090 acquisitions, which has concerned IBM.

E-type lag?

Gens said an early announcement could mean IBM will use the two-stage delivery offered with the E models. Customers buying E models received what amounted to original 3090 systems and then had them upgraded when the E enhancements became available months later.

One observer who expects later announcement and delivery is analyst Bob Tasker of The Yankee Group in Boston. He predicted a 25% to 30% price/performance gain with F models being announced in June or July for late third-quarter shipment.

Martin, Gens and Tasker concurred that the F models will feature faster thermal conduction modules. However, Tasker said performance gains will also come from the use of 4M-bit memory chips. If IBM uses those chips in place of the current 1M-bit chips, it would mean IBM speeded up its earlier plans to ship 4M-bit chips in January 1989.

Taste of SAA leaves developers thirsting for more

BY ELISABETH HORWITT
CW STAFF

The first trickle of Systems Application Architecture (SAA) documents from IBM has only whetted the appetites of software developers who plan to use the architecture to port applications across different IBM systems environments.

IBM has reportedly released two types of documents in the past two months. One type clarifies which IBM products come under the SAA umbrella. The second, in which some crucial gaps appear, consists of technical manuals that provide specifications of how to write software to comply with SAA.

Consensus among software developers is that IBM provided a solid base for SAA conformance by making many existing commercial offerings part of its architecture.

"We had SNADS and LU6.2 before they became part of SAA," said James Rathmann, vice-president of engineering for Soft-Switch, Inc., referring to IBM's Systems Network Architecture Distribution Services.

Last month, IBM shipped documents that "define what interfaces look like" for existing SAA components, according to David Wood, director of systems software products for Cincom Systems, Inc.

"Before, you only knew the general purpose of the interfaces," he said. "Now, we're beginning to have actual specifications on how to implement them."

Uncertainty abounds

Some uneasiness lurks in the software community, however, about what enhancements or changes IBM might still make to its formally announced SAA elements. IBM told developers that green text in technical manuals refers to specifications that will change from one type of machine environment to the next, according to Eugene Buechele, vice-president of engineering for Communications Solutions, Inc. "And about 5% of each manual is green," he said.

A major missing piece is documentation of how SAA interfaces will vary from machine to machine, Buechele said. "IBM introduced some fairly comprehensive documents for the overall architecture this fall, but they are really a kind of tease for the more specific documentation that will come out for each machine," he explained.

So far, the only operating system that has IBM's official SAA blessing is the company's OS/2 Extended Edition, which will not ship until July 1988.

"IBM has provided no documentation for OS/2 Extended interfaces — just some notes that give the general idea, handed out at seminars," Buechele said.

This frustrates IBM Systems Network Architecture software developers like Communications Solutions and its rival Rabbit Software Corp., which want at least one machine environment in which they can try out their SAA applications.

Developers who are exploring the available documentation said they have found much of it useful. Rabbit software engineers are also using a section of IBM's Netview/PC document that describes the EZ-VU screen formatting process.

The company is also looking at an SAA guide designed for C language programmers who "want to write portable C code that is consistent with the SAA definition of portability," said Charles Pitcher, Rabbit's director of product planning.

Another useful document provides specifications for the intelligent print data stream, which describes how to send print streams to any laser printer, Pitcher said.

In contrast, Netlink, Inc. has reportedly received none of the documents it ordered. The firm hopes these documents will specify application program interfaces for key SAA communications components.

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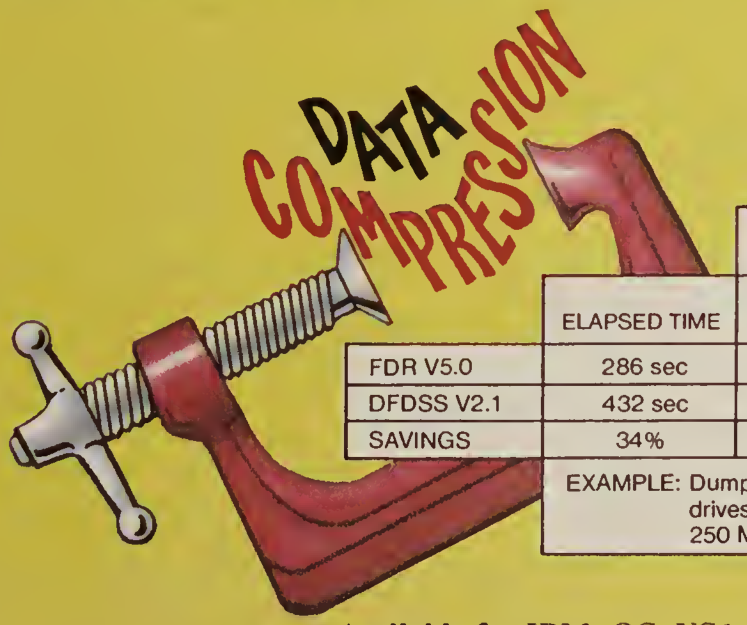

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DEC nets cheaper than IBM's to run: study

Survey of 17 Fortune 500 sites finds IBM operating costs as much as 60% higher than DEC's

BY ELISABETH HORWITT
CW STAFF

The cost of operating and maintaining a Digital Equipment Corp. network over a five-year period is significantly lower than the cost of running an IBM network, according to a 17-site study released last week by DEC.

DEC hired Cambridge, Mass., research firm Index Group, Inc. and MIT Sloan School of Management assistant professor Michael Treacy to jointly perform the study, which was based on a model that the researchers developed independently of the computer company.

The study of 17 IBM and DEC networking sites in 14 Fortune 500 companies consistently found that the initial acquisition of networking equipment, software and communications lines made up only about one-third of total costs for the five-year period, according to Treacy.

Approximately two-thirds of total costs came from operating the network and from incremental changes and additions of users and equipment, the researchers found (see chart).

Biggest discrepancy

It is in these last two areas that the study found the greatest discrepancy between IBM and DEC sites, Treacy said.

While the researchers' model could be applied across a wide variety of network configurations and applications, this particular study covered only corporate time-sharing networks, field-office networks and manufacturing networks, according to Alex Nedzel, a managing associate at Index.

Conspicuously missing from the study was a comparison of heavy-duty transaction processing networks, which are found frequently at IBM sites but less so in DEC shops.

An IBM spokesman said the company was unable to provide much comment on the study, since it had not yet had a chance to fully examine the results and methodology. IBM did, however, call into question the study's ability to factor in all the different aspects of a network and suggested that an apples-to-oranges comparison had been made.

The spokesman also referred to a similar study that The Sierra Group consulting firm in Tempe, Ariz., performed earlier this year, "independently — without DEC or IBM funding." This study found that "IBM systems and computers are incrementally cheaper to own and run over the long term," according to the IBM spokesman.

"I thought the [Index/MIT] model was pretty good in terms of breaking down the actual costs of owning a network, but I am wary of drawing immediate conclusions from a 17-sample study," said Bruce Coughran, a market analyst for communications at Computer Intelligence in La Jolla, Calif. Such a study would be "an apples-to-oranges comparison, since corporate networks are really multiple, heterogeneous, multivendor networks," Coughran added.

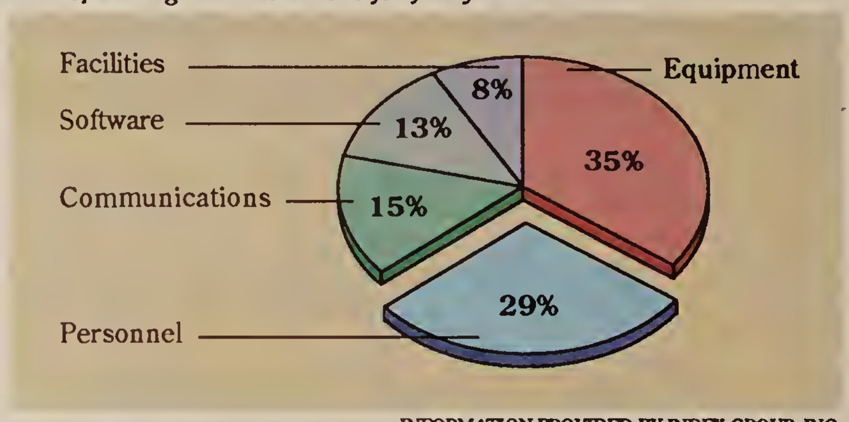
Treacy said the researchers' findings held true in all three categories of networks that were covered. "Across all of the networks we studied, there was a significant difference [between IBM and DEC sites in terms of] cost per network move or change. The more dynamic the network, the greater the discrepancy," he said.

Study results included the following:

- The personnel costs for operating and incrementally changing DEC networks were generally lower than the costs at IBM sites. Corporate network and manufacturing network comparisons showed that the personnel costs for moving or adding a user or device were between $115 and $160 for a DEC network, compared with $583 to $700 for an IBM network.
- Total operational costs per port for an IBM network were consistently higher than the same costs for a DEC network. On the average, operational costs over the five-year period were 60% higher for IBM networks than for DEC networks, DEC said. Five-year personnel-related operational costs per port were also higher, on the average, for IBM sites; in one field office, however, costs for a DEC network were 87% higher.

People power

Personnel expenses make up nearly a third of the cost of installing and operating a network code for five years



INFORMATION PROVIDED BY INDEX GROUP, INC.
CW CHART

The difference in operational costs was much more marked when a DEC network was being compared with a centralized IBM network than when two distributed networks were being compared.

"It wouldn't surprise me if IBM networks are more personnel-intensive than DEC's," Computer Intelligence's Coughran said.

He added, however, that he was unsure whether the sites that the researchers studied were comparable in areas such as functionality and flexibility — two of the model's key criteria for evaluating a network.

Less manual effort

DEC has said that the lower operating costs associated with its networks are a result of the fact that the equipment requires less manual intervention when something fails.

The incremental-change costs for DEC are lower primarily because DEC, unlike IBM, provides consistent interfaces across all of its computing and networking devices, said Frederick Balfour, DEC's local-area network product marketing manager.

While the researchers did not conduct a scientific study to measure the man-hours needed to repair either company's networks, individual interviews indicated that DEC networks required less personal intervention, according to Index's Nedzel.

"We do have hard numbers that show a significant difference between DEC and IBM in the overall resources allocated to these areas," he said.

Comparable initial costs

Differences in acquisition costs were much less significant between the two vendors. In many one-to-one comparisons, initial acquisition costs for an IBM site were about 20% higher than those of comparable DEC sites. But in a field-office network example, a centralized IBM configuration was less costly than a DEC network.

Nedzel said the researchers were unable to find enough DEC sites with heavy transaction processing networks to provide meaningful comparisons, so they did not include that type of application in the study.

The small percentage of overall costs taken up by initial acquisition "was a surprising result" that should be taken to heart by companies planning new networks or cost-analyzing existing ones, Treacy noted.

In contrast, the study found that personnel costs make up 29% of overall expenses in a corporate network, "an unexpectedly high figure," Treacy said. Communications line costs only make up 15% of overall expenses in corporate networks. "A lot of companies spend a lot of resources trying to minimize line costs," he said.

Olympic

CONTINUED FROM PAGE 1

find out how they did this in 1984," Russell said.

One of the biggest results of the meeting was a transfer of technology. The Calgary committee purchased what is called the Primary Results System, software that was developed by the Yugoslavians for the 1984 Winter Olympics. The specialized software collects the initial results from scored and timed events.

The biggest hurdle to overcome was not negotiating for the software but translating the software from Yugoslavian to English. When that was done, "we adapted the software to our [IBM 3081] environment and committed early on that we would use IBM hardware," Russell said.

Proud of the Calgary committee's transportation and accreditation system software, Russell said, the contingent from Albertville, France, is already scheduled to take a look at his group's application for use at the next Olympiad.

The system

A description of the Calgary Olympics' basic computer system setup is like a lesson in human anatomy; the hip bone is joined to the leg bone and so on.

When the Games begin, judges' scores will be logged on terminals linked to IBM PCs. From those machines, data will be fed to a computerized scoreboard by Daktronics, Inc.

The scoreboard data will be transmitted to the Primary Results System software resident on the 3081 Model GX, which is tied to turnkey timing and data collection computers. The data is eventually fed back to video character generators, which give sports commentators the results. Only two seconds elapse between the end of the event and when the commentators get the information.

The selection of IBM's DB2 for its relational data base was key in the development of other application programs that rely on data base features such as the materials management application.

Using the latest technology, Nick Lundhild, telecommunications manager on the project, stressed that the voice and data is integrated through T1 trunks throughout the city. The IBM Systems Network Architecture host network shares space on T1 pipes with the voice network, based on the Northern Telecom PBXs.

Approximately 100 miles of coaxial cable using a broadband Sytek, Inc. local-area network will operate Info '88, a personal computer and terminal network application designed to provide journalists and officials with a potpourri of data on athletes, Calgary attractions and Olympics background.

Olympic spirit seems to offset the committee members' pay, which is somewhat lower than what an MIS staff would get in a corporation.

According to Russell, employee turnover is very low. "People can all easily identify with the goal," he said.

Backup provisions

For electrical backup, the MIS department has purchased a war chest of uninterruptible power supplies. The department will use a 4381 as a backup computer. Using IBM's TPNS network simulation software, the MIS department has gone through every "what-if" trouble scenario it could imagine to determine how the network would handle various emergencies during the Games.

If anything does go wrong, the committee will have a host of volunteers to draw from. Each evening at 5 p.m., at least 600 volunteers take turns coming in for training on the telecommunications equipment, computer gear and other miscellaneous hardware and software products, said Lundhild, who continues to work 15 hours a day on the gargantuan project.

"It's a matter of how far you have to go without getting paranoid," Lundhild said. "Now that the torch relay has started, we are all getting our adrenaline pumped up. It's been a lot of work. When the closing ceremonies come, we are going to stand there and feel real damn good about it all."

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Texas Air, American in reservation fight

BY DAVID A. LUDLUM
CW STAFF

HOUSTON — Texas Air Corp.'s reservations arm last week fired another salvo in its campaign to encroach on American Airlines' leading position in the market to provide computerized airline reservation services.

System One Direct Access, Inc., a Texas Air unit, filed a suit against American charging it with trying to block travel agents from using reservation services offered by System One and others.

Major airline mergers have brought about heightened competition for American in the reservations market, principally from Texas Air, which operates Continental Airlines and acquired Eastern Airlines in November 1986.

The competition has cut into the hefty profits American has earned from reservation services, according to analysts, and threatens to erode the services' contribution to ticket sales.

Last month, American filed a state court suit seeking $100 million in punitive damages from Texas Air. It charged Texas Air with illegally coaxing travel agents to break contracts with American's Sabre reservation service and to switch to System One by offering free services and indemnifying the agents against claims made by American.

Denies allegations

In addition to its own suit, Texas Air responded to American's earlier suit. The company denied the allegations, claiming that American engages in the same practices and contending that travel agents' contracts with American are illegal on antitrust grounds.

American has also filed suits this year against a dozen or more travel agencies for breaking contracts with it and switching to System One.

In the latest suit, filed in federal court in Houston, System One charged American with inhibiting competition through its lawsuits and illegal terms in contracts with travel agents. The questionable contract terms include the following:

- Rollover clauses requiring agents to enter new, five-year contracts whenever they add equipment or services.
- Liquidated damages clauses that require agents who break a contract to pay American for revenue the airline stands to lose from the cancellation, for lost fees and for the costs of removing equipment.

The U.S. Department of Transportation is investigating the charges imposed on travel agents who break computerized reservation service contracts. Rollover clauses are prohibited by the U.S. House of Representatives version of the federal Airline Passenger Protection Act, which is awaiting resolution with the Senate version of the bill.

System One has not set a figure for the damages it will seek, but the company estimated losses "in the multimillions of dollars," said spokeswoman Charlotte Kirk.

In a statement, Richard E. Murray, president of System One, noted that in 1984, the Civil Aeronautics Board ruled it illegal to prevent travel agents from switching reservation systems. "American Airlines has not only ignored this regulation but, in fact, has increased its activity directed at excluding competitors from the marketplace," he said.

IBM eyes TCP/IP for science net

BY ELISABETH HORWITT
CW STAFF

DETROIT — A $14 million, five-year contract to upgrade the National Science Foundation's (NSF) network has IBM discarding its traditional Systems Network Architecture communications protocols for Transmission Control Protocol/Internet Protocol (TCP/IP), Ethernet and Open Systems Interconnect (OSI) protocols.

IBM was part of a team of bidders the NSF selected to expand, upgrade and manage NSFnet, a national network that links research centers and universities to NSF's six supercomputing centers. The team was assembled by Merit, Inc., a regional consortium of universities. The third member of the team, MCI Communications Corp., will provide the T1 connections between different NSFnet nodes.

The contract calls for increasing the capacity of NSFnet links to 1.5M bit/sec. T1 speeds and implementing a management system that will automatically reconfigure the network to handle sudden bursts of traffic, according to Eric Aupperle, director of the Merit Computer Network. IBM will supply a network management system based on Netview.

Each regional computing or research center on the network will be equipped with an IBM system consisting of multiple RT Personal Computers to route traffic between incoming T1 links and local Ethernet-TCP/IP local-area networks. The contract calls for migration to OSI within a five-year period.

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Difficult to Manage

To effectively manage a multiple CPU environment, certain problems must be recognized and solved. An unbalanced work load occurs when devices become overloaded. Response times become slow, and processing bottlenecks occur with no way to diagnose the source of the slowdown. Far more critical problems don't become apparent until long after serious damage has been done.

Also, operating systems don't communicate well with each other, so the possibility exists for different systems to concurrently and accidentally modify the same data, resulting in the loss of data integrity. If the errors are discovered, they can sometimes be corrected, but not without great expense. Unfortunately, some errors in data integrity can go undetected indefinitely.

Segregating devices, data, and applications to preserve data integrity isn't a viable solution. Duplication of hardware, operating system programs and data sets for each CPU is too expensive, and it places an enormous reliance on manual scheduling and control. As processing loads increase, manual procedures get a bit out of hand. There's no way to offload jobs from one CPU to another, nor is there a way for one CPU to act as backup for the other unless the data is duplicated.

The most effective solution to operation problems is to have multiple processors act as a "single system."

A Real Solution

The most effective solution to operation problems is to have multiple processors act as a "single system." Logically connecting devices to share resources without compromising data integrity, streamlining consoles to monitor and control all CPUs from a central point, and automating certain operator functions to reduce the risk of human error are benefits every multiple CPU environment should enjoy.

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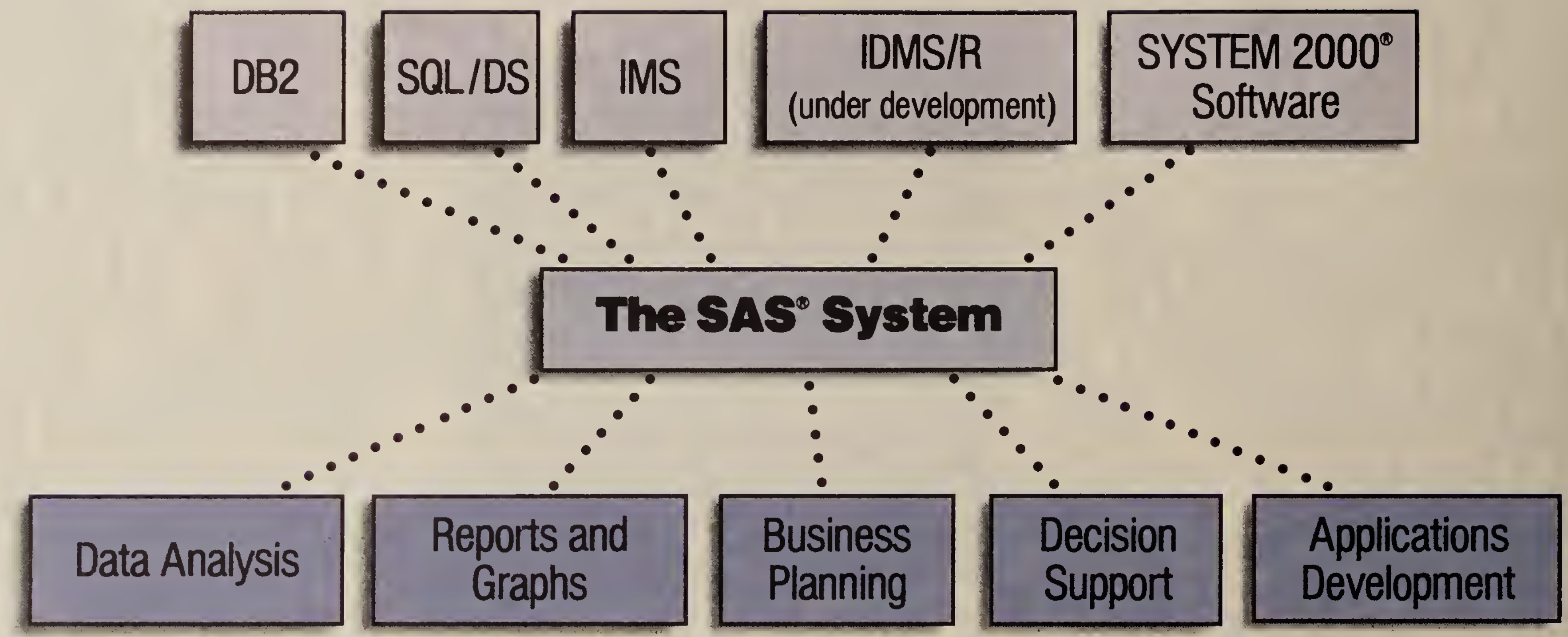

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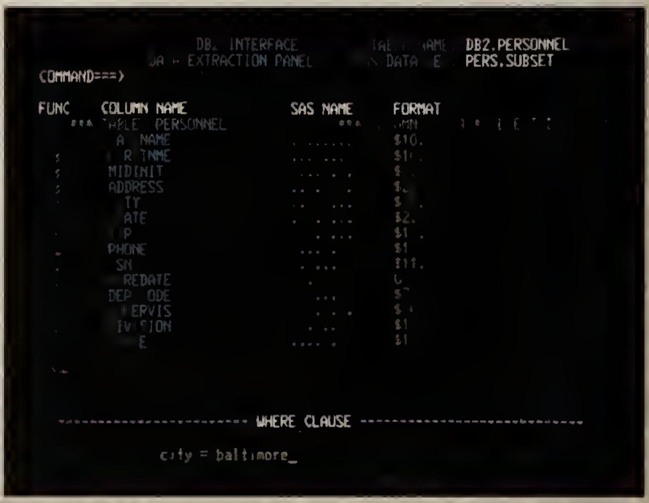

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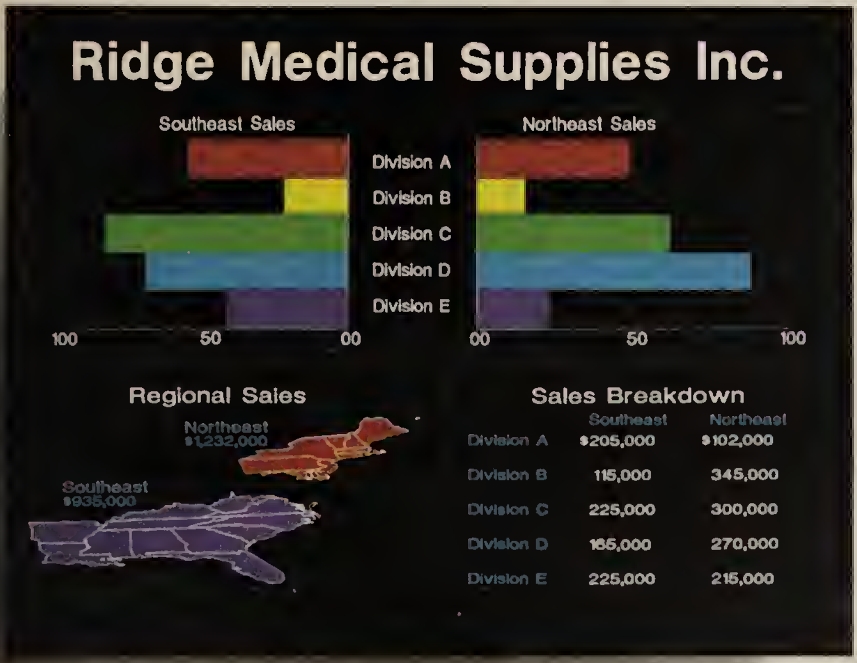
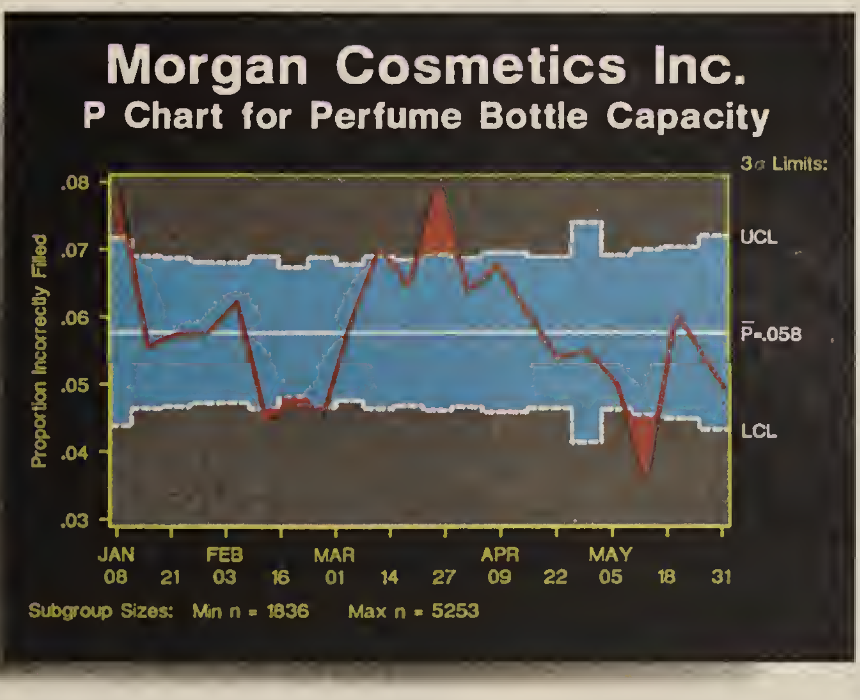
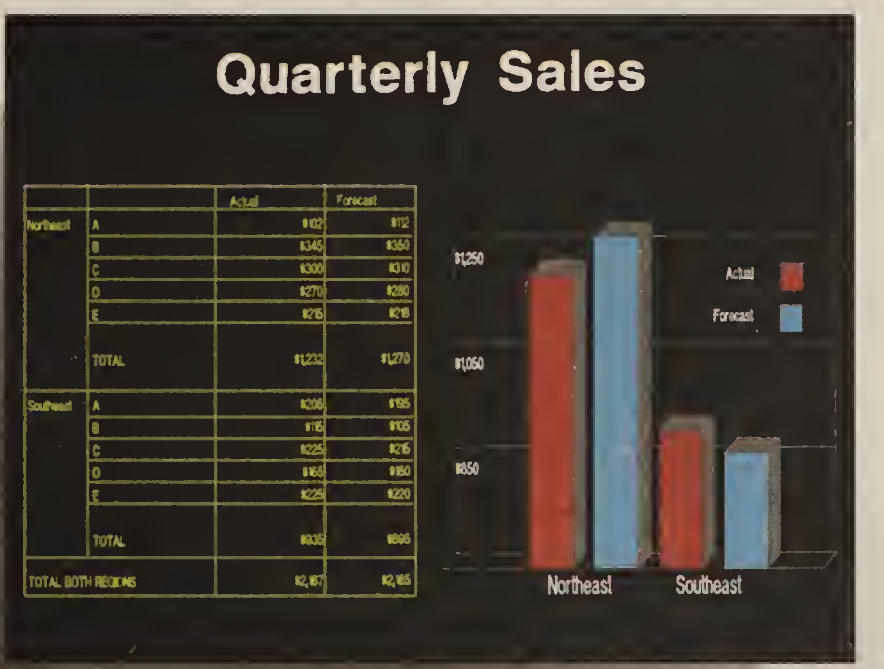
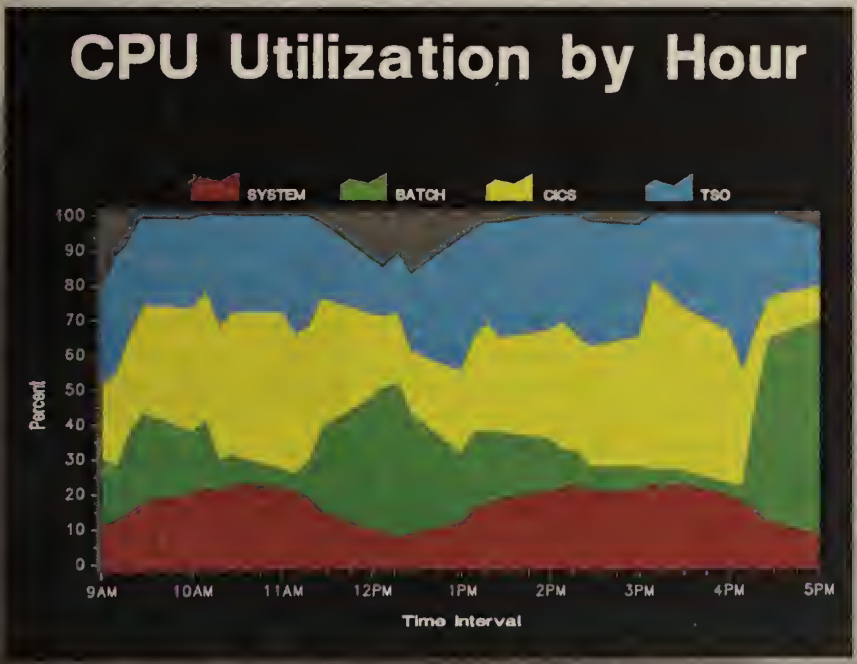


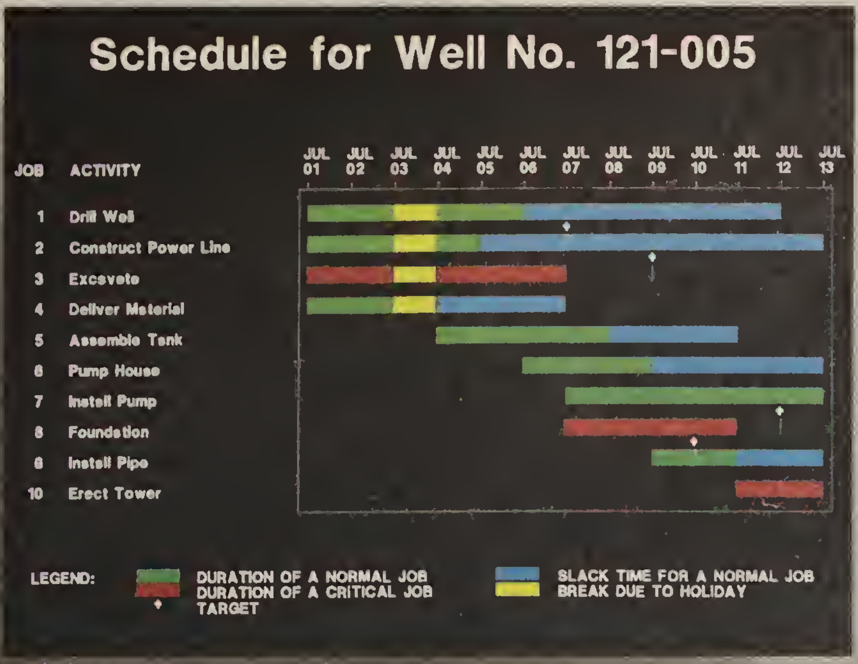
	Southeast	Northeast
Division A	$205,000	$102,000
Division B	115,000	345,000
Division C	225,000	300,000
Division D	165,000	270,000
Division E	225,000	215,000





		Actual	Forecast
Northeast	A	$102	$112
	B	$345	$350
	C	$300	$310
	D	$270	$280
	E	$215	$218
	TOTAL	$1,232	$1,270
Southeast	A	$205	$195
	B	$115	$105
	C	$225	$215
	D	$165	$160
	E	$225	$220
	TOTAL	$935	$895
TOTAL BOTH REGIONS		$2,167	$2,165





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FCC considers added charge for private nets

BY MITCH BETTS
CW STAFF

WASHINGTON, D.C. — The Federal Communications Commission last week launched a broad reexamination of its policy toward private networks to determine whether private line users pay their fair share of the costs of using a local telephone exchange.

Specifically, the FCC voted to consider whether to impose switched access charges on those interstate private lines that use the local exchange to originate and terminate traffic on the public network. The FCC now imposes a flat $25 monthly surcharge on private lines as a rough, or "surrogate," method of covering the access costs of off-network calls, but it is searching for a more accurate way to measure the actual costs.

The new proposal would replace the special surcharge with access charges averaging 7½ cents per minute, which would represent a cost increase for high-volume networks, according to Gerald Brock, chief of the FCC's Common Carrier Bureau.

"We're really just raising the question again. . . . Is there a better way than the surcharge?" Brock said. The commission is seeking public comments to consider before making a final decision next year.

Most business and government networks terminate their private lines in private branch exchanges (PBX) or Centrex equipment that can route interstate calls through the local exchange switch to make local connections, the FCC said. The problem is that the interstate calls appear to the local exchange carrier as local calls, making it difficult to apply access charges.

FCC officials said they suspect recent technical developments in Centrex and PBX equipment will make it possible to measure interstate traffic "leaked" into the local exchange.

The commissioners acknowledged, however, that it still may not be possible to accurately measure all of the interstate traffic. In cases where measurement is not feasible, the FCC said it will consider applying a modified version of the surcharge. The FCC "asks for comment on whether switched access charges should apply whenever measurement is possible or whether there are policy reasons for continuing to exempt some private networks from access charges," the announcement said.

In a related ruling, the FCC said users must pay the same access charges for Centrex electronic tandem switching services as they do for AT&T's Common Controlled Switching Arrangement. The FCC said the two competing services perform virtually the same function, that is, routing private network traffic into and out of the local exchange.

Timeplex to serve up '88 ISDN link

BY ALAN ALPER
CW STAFF

WOODCLIFF LAKE, N.J. — Timeplex, Inc. said last week it is developing a D channel server that will enable its Link family of multiplexers to connect to Integrated Services Digital Network (ISDN) transmission lines. D channel is a bandwidth used to carry signaling information between switches on a network at 64K bit/sec. increments.

The D channel server will be tested during first-quarter 1988 when Timeplex conducts ISDN trials with several as-yet-undisclosed communications providers. The company's first implementation of the server will support the ISDN Primary Rate Interface, said Alan Spiegleman, technical assistant to Edward Botwinick, Timeplex's chief executive.

Development of the D channel server will come in three phases, Spiegleman said. Initially, the server will be contained in its own box for development ease and test purposes during the ISDN trial. In the second phase, the server will be integrated into a modified ILP digital voice processor module and inserted into a Link multiplexer. The final phase involves developing a gateway between Primary and Basic Rate Interfaces, he said.

Although Timeplex expects to integrate the server into its Link 2 and Link 100 multiplexers, the company is also considering marketing it as a stand-alone product, Spiegleman said.

Since European countries are ahead of North America in readying ISDN services, the D channel server could debut there first, Spiegleman said.

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IBM defers service change

Moves back Dec. 1 target in response to CDLA pleas

BY STANLEY GIBSON
CW STAFF

In a meeting at IBM headquarters in Armonk, N.Y., last week, officials of the Computer Dealers and Lessors Association (CDLA) achieved a three-month deferment for the effective date of a recent IBM announcement.

The policy, announced Nov. 3 and slated to become effective Dec. 1, requires third parties performing deinstallation and reinstallation to pay IBM a month's maintenance charge or hourly fees for diagnostic tests requalifying the equipment for IBM maintenance.

Previously, IBM had charged only when it made specific repairs on machines to requalify them for the IBM Maintenance Agreement.

Computer leasing companies, dealers and maintenance firms are up in arms about some IBM policy changes, which they claim are a threat to their business [CW, Nov. 9].

Although third parties said they will not pass the added costs that result from the changes on to their customers, they said the pressure on profit margins could thin their ranks, resulting in fewer choices for users.

Richard Forsythe, chairman of CDLA's IBM relations committee, said the policies are "of serious concern to our industry" and "could be mortal" to some companies. Forsythe, CDLA President Jim Benton and four other CDLA officials met last Monday at IBM headquarters with Ambrose Carr, chief of IBM industry relations, and other IBM executives to present their case in opposition to the policy changes.

An IBM spokesman confirmed that the effective date of the policy concerning IBM Maintenance Agreement acceptability has been postposed until March 1 but said other points covered in the announcement remain unchanged.

"We reviewed the implementation process with various groups and decided that more time was required to completely implement the program," the spokesman said.

Ken Pontikes, president of Comdisco, Inc., participated in the meeting and said the delay is welcome but that CDLA would like the policy to be changed. "We pointed out to [IBM] that the announced policies possibly are not in the best interest of anybody."

Forsythe claimed the charges to leasing companies for IBM Maintenance Agreement approval would eventually add up to an unreasonably high total.

"IBM caught some dolphins in the tuna net," Forsythe said. He added that the stringent requirements and costs for IBM maintenance recertification will penalize all leasing companies without stopping the problem of third parties tampering with equipment, which, he admitted, may have been done by a few unscrupulous firms.

He also claimed the record-keeping that IBM would have to perform on the approximately 500,000 items currently leased would be so extensive and costly that it would wipe out any IBM revenue gain from the additional fees.

On Nov. 3, IBM said it would eliminate extra charges for 24-hour, seven-day-a-week service for IBM Maintenance Agreement customers.

Out with the old . . .

In addition, IBM announced it would deinstall and reinstall IBM equipment within six months at no charge if that equipment is displaced by new IBM equipment. But the new installation, which need not be at the same customer's premises, must be under an IBM Maintenance Agreement.

Meanwhile, maintenance companies are chafing under changes in IBM's parts availability policies that were made prior to Nov. 3. Those conditions specify that maintenance firms must buy parts at one of 20 centers around the country rather than at the approximately 100 branch offices they could previously use.

CDLA's Benton said the parts policy was also discussed in Armonk, but he declined to give details.

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EDITORIAL

Buyer beware

THE CHRISTMAS SHOPPING SEASON is a boon to retail merchants, but for those who buy and sell computers, the refrain is familiar: 'Tis the season to cut prices.

The final month of the year usually finds computer and software vendors climbing over each other in a frantic effort to sign a few more contracts before the fourth-quarter accounting period closes. This year will be no exception. Even IBM has joined the fray with unusual vigor, offering six-month free trials and price protection to some potential mainframe buyers.

In the short term, such competition benefits the buyer. Vendors cut their margins at precisely the time when many managers are looking to spend surplus budget dollars. It's also to the buyer's advantage to play the sellers off against each other. But in the long term, price should rank low on the list of priorities to consider when making a large-scale investment.

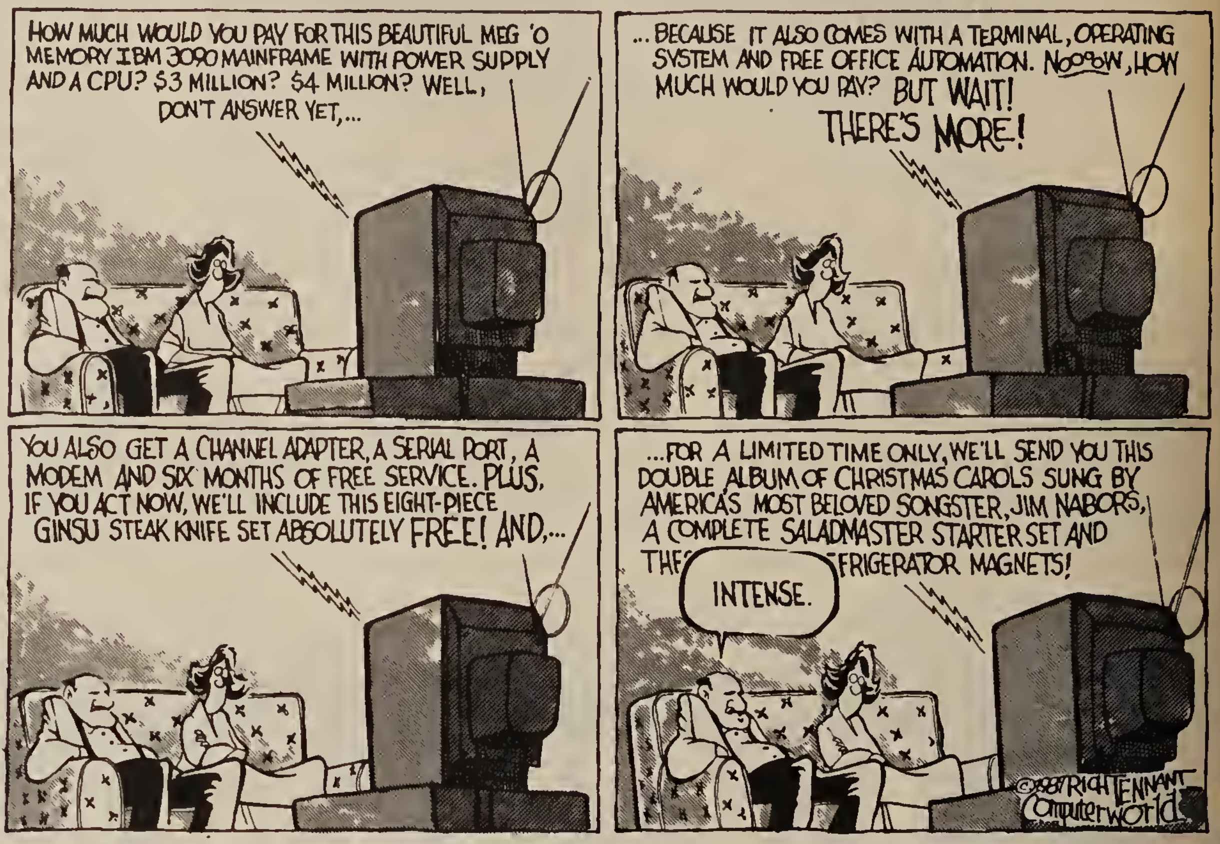
The reason is that off-the-shelf packaging is rapidly giving way to customized systems. No longer will User A's general ledger, network or hardware configuration satisfy User B. Increasingly, each user will demand machinery and brainpower designed for his environment.

The trend toward customization is a good one for the industry. But it also requires both buyers and sellers to rethink their attitudes toward each other. When a buyer invests in hardware or software today, he is, more than ever, signing a long-term pact with a vendor, placing trust in that seller's ability to change with the times and adjust to the buyer's needs. The seller, in turn, needs to recognize that he cannot simply sign a contract, ship a tape or box and then sit back to collect maintenance fees. It's now incumbent on him to adapt to the user's environment, embrace the user's standards and stand by the user when the environment changes. In other words, both buyer and seller are in it for the long term.

It's good to see the computer industry shedding any department store pretentions it may have once had. But price cutting just doesn't fit with this new business alliance. As we enter the most uncertain economic times of this decade, everyone's budget will come under scrutiny. Now is not the time for vendors to cut their profits and sacrifice their long-term viability in a finish-line attempt to tune up the financials.

Users must also take their own economies into account. Surveys consistently show that the cost of buying a software package, network or even a computer is only a fraction of the cost of customizing it, maintaining it and training users to operate it. As systems become more complex, more of that specialized work will be done by vendors. With that in mind, can a few dollars off the top be adequate reason to choose one system over another?

When a vendor tries to cement a sale next month by offering to lop another 10% off the asking price, buyers need to stop and ask themselves: Is this a marriage made in heaven or a deal made in desperation?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LETTERS TO THE EDITOR

Never assume

In "You are what you do" [CW, Oct. 19], Tim Lynch, working from mistaken assumptions and preconceived notions, wrote a dangerously misleading article — dangerous because it presumed, with insufficient justification, to make blanket assumptions about a group of people and because it misled the reader into believing that those assumptions were established fact.

Lynch's preconceptions and overgeneralizations were clearly demonstrated in the following paragraph.

"As a result of being what I consider overly involved, [programmers] all exhibit certain patterns of behavior . . ."

His analogies were not accurate. He stated that we need not learn to think like a hammer in order to use a hammer, but that we must adjust our thought patterns to those of a computer to be able to use it. (He said "use it," not "program it.")

First, Lynch made a faulty assumption that computers "think." Second, he does not seem to understand the use of computers. What users actually do is learn to accomplish their own desired task within the framework set up by whoever wrote the software. So, if anything, they learn to think like another person. We learn to operate a computer in the same way we learn to operate a car — we learn to use its functional abilities to satisfy our needs.

The programmer, of course, has to understand how the computer works, in the same way an automobile designer has to understand how a car works. But that does not mean the auto designer "thinks like a car," and it does not mean the programmer "thinks like a computer."

The most glaring methodological defect in Lynch's article, however, was his nonestablishment of causation. Even if we were to assume that his observations were correct (and I don't think they were), to say that two facts coexist does not prove that one caused the other. There are several other possibilities. The first could cause the second. The second could cause the first. They could be related but both caused by a third fact. Or they could be unrelated, coincidental.

For example, if a survey showed that more murderers have brown eyes than any other color, that would not prove that having brown eyes makes you a murderer. It also would not prove that committing murder causes brown eyes. It could be that there is an undiscovered related cause, but the most likely answer is that it is a coincidence, since there are also more people with brown eyes in the population at large.

Lynch said computer programmers have certain antisocial traits and that working with computers must therefore "cause" them to acquire these characteristics.

To really prove this thesis, he needs to test programmers before they become computer users and then document the personality change that takes place. Simply surveying programmers now proves nothing, because they could have had such characteristics before they became programmers.

Even if all programmers had the personality traits Lynch described (which my own experience tells me is not true), his data, as presented, could have instead been used to claim that programming attracts people with that type of personality or that having that kind of personality predisposes one to becoming a programmer.

Lynch wrote an article full of opinionated and unsubstantiated nonsense. His fuzzy thinking makes him the kind of writer who gives the social sciences a bad name.

Fred Chapin
New York

Computerworld *welcomes comments from its readers. Letters may be edited for brevity and clarity and should be addressed to Bill Laberis, Editor,* Computerworld, *P.O. Box 9171, 375 Cochituate Road, Framingham, Mass. 01701.*

This week in history

Nov. 28, 1977
A New York federal court judge rules computer specialists and their clients have a "special relationship" that may make data processors liable for their actions even years after a contract has ended — a liability comparable to that of an architect and subject to malpractice claims by a client.

Nov. 29, 1982
A *Computerworld* survey finds that several companies are successfully using aptitude tests to screen applicants for entry-level programming jobs, despite general paranoia over how the Equal Employment Opportunity Commission will receive such initiatives.

Excel vs. 1-2-3: What's good enough?

RUSSELL LIPTON

The computer industry thrives on the great melodramas that take place among the industry titans. Can 1-2-3 knock off Visicalc? (Yes.) Can Turbo C knock off Microsoft C? (Draw.) Can anybody knock off Dbase? (No, or at least not yet.) Will Excel knock off 1-2-3? (No, but does anybody care?)

Don't get me wrong. I'm a big fan of Microsoft Corp. Sure, the fact that the press fancies Bill Gates as the new Henry Ford is no longer as adorable as it was when *Time* declared its Man of the Year a computer. Sure, Microsoft is always unspeakably late with its software; to say that OS/2 is "on time" more than three years after the delivery of 286 machines takes the grand prize even over the delayed entry of Windows.

> IF ANY given product is good enough and if a million or more users are reasonably satisfied with it, build a clone or get out of town.

Nonetheless, if you want to recover that warm, fuzzy feeling, just speculate on where the personal computer industry would be today without Gates & Co. When we consider how difficult it is to successfully manage even a one-product company (a category in which I place Ashton-Tate Corp. and Lotus Development Corp.), we can better appreciate the extraordinary flow of creative and organizational energy that has kept Microsoft atop almost every significant computing wave of the past five years.

So why don't I really care that Microsoft is finally launching its long-awaited 1-2-3 killer, Excel, into the largely soporific IBM software marketplace? And why won't Excel excel?

It's not because of the product's shortcomings. True, I haven't been among the privileged few who have seen Excel on the PC, but I have long enjoyed it on Apple Computer, Inc.'s Macintosh. Excel is better than 1-2-3, no question.

For that matter, Excel is, in my opinion, by far the best of Microsoft's application products. So, why don't I think the PC marketplace is going to care a great deal?

Quite simply because 1-2-3 is plenty good enough to make me, and certainly any corporate standards manager, very skittish about moving to any competing PC product — except, just possibly, a "better" 1-2-3 clone, like Borland International's new Quattro. This "good enough" rule is the unstated driver of all software development. My version of the software marketing rule of "good enough" runs like this: "If any given product is good enough and if a million or more users are reasonably satisfied with it, build a clone or get out of town."

Virgin territory

Cloning is, of course, the modus operandi of hardware companies the world over that want to compete with IBM, even though they could build it better — unprofitably better. When a market is virgin territory, one must pioneer. But when the market is mature, those who pioneer usually get arrows in their backs.

Now Microsoft Excel is, in fact, so fine, and Microsoft is itself such a compelling force, that PC Excel is certain to carve out a reasonably profitable market share for itself. And no one says Excel has to beat out 1-2-3 in order to be a successful and reasonable component of Microsoft's total offering.

There are those, in and out of Microsoft, who see 1-2-3 getting a bit long in the tooth and dream dreams of toppling the old fellow. Excel's secret weapon is supposed to be its tight coupling with Windows, which is certainly no small benefit. While graphical environments for the PC will not soon become as dominant as they are on the Macintosh, the standardization — particularly of file transfers — of the Windows products will become more and more of a presence on the PC. The existence of a compatible Excel on the newly popular Macintosh is also a selling point.

But why shouldn't 1-2-3 evolve into a Windows product, if the Lotus gurus so choose? True, for reasons of pride, they may not do so, but they can, can't they? We might feel nostalgia for 1-2-3's ring menus, but they are hardly integral to the product.

More to the point, won't 1-2-3 itself continue to evolve? Given

Continued on page 18

Lipton is vice-president of IBP, Inc. and publisher of a technical journal on the fourth-generation language, Focus. He is also currently preparing a book for publication.

Star Wars: When imperfect man strives to make perfect machines

HARVEY NEWQUIST

This is a story about machines and maintaining them.

I have a washing machine that has been serviced six times in the last three months.

My girlfriend's portable computer has had several hard disk crashes in the last few weeks. Dozens of innocent files were destroyed.

My brother's compact disk player gets stuck on the eighth track of every CD he plays.

My father's Audi 5000 is a story about vehicular machines unto itself.

My country's president wants to put mechanical systems into space that will decide for themselves how to employ destructive missiles and lasers — "Star Wars."

Man has had a so-so history of making perfect machines. His performance in servicing them and keeping them in proper working order is even less impressive. As the Reagan administration draws to a close and computer technology and artificial intelligence capabilities rush forward at an astounding pace, the U.S. military is trying to combine them and figure out how to put the ultimate weapon into the atmosphere. Unmanned.

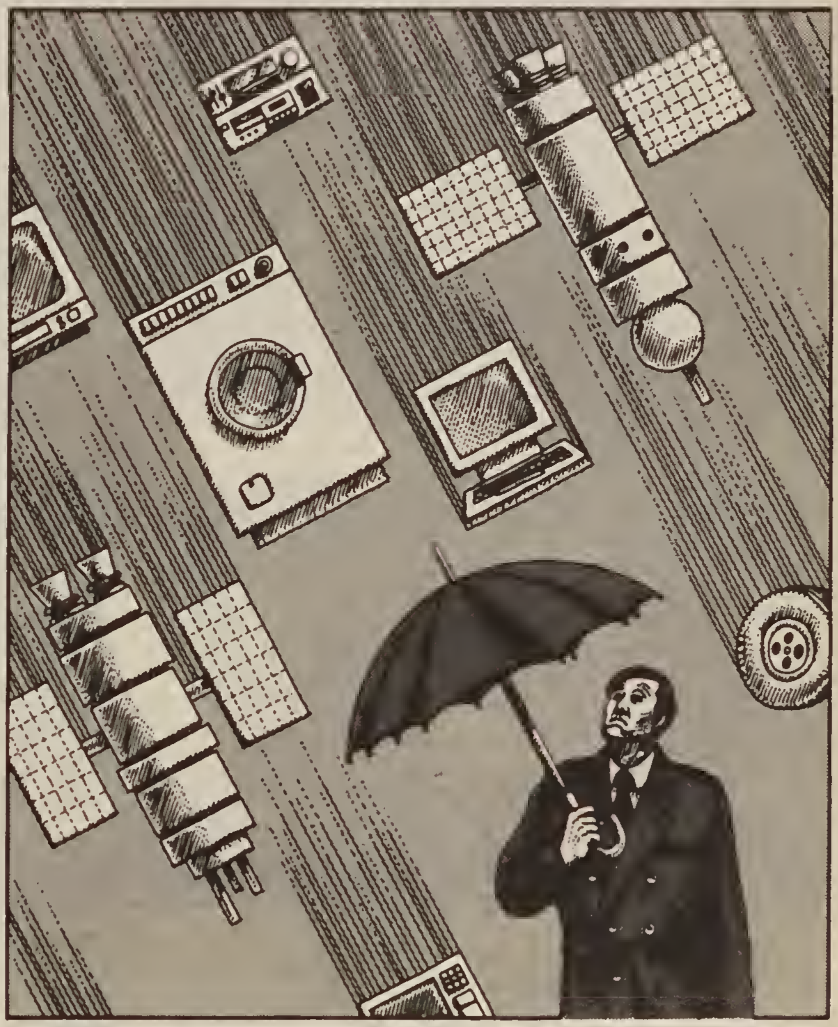
I believe that a complete Star Wars system can be sent into outer space in the next 10 years; I'm just not so sure it will work.

The inspiration for these thoughts comes from two sources: the everyday world, which suffers at the hands of malfunctioning machines more often than we would like, and a book entitled *Computers In Battle — Will They Work?* edited by David Bellin and Gary Chapman (Harcourt Brace Jovanovich).

The book raises a lot of questions that would give you goose bumps on the warmest of days. It is especially disconcerting to those of us who have dealt with computer evolution in the last few years. Computers are wonderful machines, but they're never perfect. The Department of Defense plan calls for perfect computers. It doesn't know where the perfect computers will come from, but it is basing Star Wars on them.

Bellin and Chapman present essays from noted researchers and military watchers, most of whom are deeply involved in both hardware and software development. Given the current state of computer technology, the book holds Star Wars as an unrealistic effort.

And Star Wars plans to use the most advanced of the advanced: artificial intelligence, expert systems, pattern recognition, fault-tolerant and parallel processing, autonomous decision making and independent, self-guided operation. Part of the problem is that each of these computer techniques is still in its infancy, and many have not been commercially (or developmentally) proven.



MIRKO ILIC

Fixing bugs on the fly

This fact may not be a big deal in the industrial and corporate markets, where fixing bugs and glitches on the fly is a way of life after system installation. However, when your system operates several miles straight up in the air, with no possibility of repairmen making a service call, some of the drawbacks of a deployed space weapons system become apparent.

These systems aren't doing batch processing or inventory control, relatively routine functions by normal computing standards. They are designed to dispense "kill power" based on an ability to recognize incoming missiles in a matter of seconds and then decide whether to destroy, intercept or ignore them. This capability presupposes the system can tell if the weapons it senses are friend, foe, neutral or missiles at all, as opposed to deactivated satellites or maybe large fires on the Earth's surface. Oh, yes, the machine must decide in the time it took you to read this paragraph.

Star Wars systems cannot be tested until they are required for use. You can't beta test them half a mile over the New Mexico desert because the real-time environment in space is not the same. You can't fire thermonuclear warheads at them and see how they'll react in some test lab up in northern California.

You have to put them in place and hope for the best. And if someone forgot to stabilize a disk drive (as they did with my girlfriend's portable), it's pretty much tough luck. You don't just send someone out to repair an oversight somewhere in orbit over earth.

In order to work in real time in space, the machines must be autonomous — make their own decisions. This ability is one of DOD's biggest pursuits in a number of areas, not just Star Wars. It is planning an unmanned tank with decision-making capabilities called the Autonomous Land Vehicle for the U.S. Army. It is investing in a computerized copilot for the U.S. Air Force called the Pilot's Associate, which will take some of the work load off the man in the cockpit. A Battle Management System that will plan strategy for the U.S. Navy

Continued on page 18

Newquist writes and consults on artificial intelligence and other advanced high-technology topics from his office in Scottsdale, Ariz.

Perfect machines

CONTINUED FROM PAGE 17

faster than its human counterparts is in the works.

The upshot is that humans are being taken out of the decision-making loop, yet they live on on the receiving end — where the "kill power" goes. Because of the need for split-nanosecond timing, there is no time for human interaction to judge whether to activate weapons. We rely then on the perfect operation of a machine created by imperfect humans.

Leaving such a machine unattended makes me nervous. I won't even let my printer go for five minutes without double-checking to make sure it hasn't screwed up.

There is a great scene in the computer-fantasy movie *Westworld* when the lead robot states that computer operation in the facility is perfect and that, "Nothing can go wrong . . . go wrong . . . go wrong . . . go wrong . . ."

Californian threats

Suppose for an instant that an autonomous Star Wars system decided most of southern California was actually a threat to mankind's survival, having mistaken some of the annual San Fernando Valley fires as heat from a full-scale weapons launch. A few well-placed laser and missile blasts could leave the U.S.'s playground looking like the Sahara. Unfortunately, this misplaced attack would probably happen so fast that there would be no time to enact surface defense systems.

I could bring to the argument other computerized weapons systems, like the infamous Sgt. York tank, but that's a whole other story about computers in battle. Suffice to say that the billions of lines of code and the sheer flawlessness required to make Star Wars a functioning reality is daunting, aside from the moral question of littering the sky with weapons.

For a society that has almost forgotten what it is like to have machines work the first time every time, the prospect of a fully enabled computerized space weapon doesn't make it any easier to sleep at night.

Good enough

CONTINUED FROM PAGE 17

that 1-2-3 is already a more than adequate product for at least 95% of its users (based on my unscientific measurements) and given that Lotus is certain to respond in kind to any significant Excel functionality, why should I retrain myself for Excel? And, naturally, Lotus has announced its upcoming version of 1-2-3 for the Mac.

Putting the argument another way, Microsoft is a systems company that also happens to make applications software. Lotus is an applications company — no, Lotus is a spreadsheet company, even though it says it isn't.

The spreadsheet metaphor

That's no slap at Lotus, by the way. Let's reverse positions. Would users rush to buy a Lotus DOS instead of a Microsoft DOS? Expertise in software can be acquired but not easily or cheaply. The spreadsheet metaphor has its limits, and Lotus is correctly diversifying as quickly as possible into other areas, but it is far from being played out as a model under which hordes of end users can perform not only spreadsheeting, but data file manipulation, graphics and word processing.

Certainly, Microsoft will not and should not abandon a product like Excel. But, at best, Excel is one of many small Microsoft products competing for internal resources and attention with such behemoths as OS/2, C and Windows. For Lotus, 1-2-3 is the company.

Borland's Quattro is another question. Using a 1-2-3 work-alike from a major company (one clever enough and wealthy enough to avoid being wrongfully sued by Lotus) can be an attractive proposition. Quattro offers not only work-alike 1-2-3 functionality but a superior graphics module that addresses one of the few remaining major weaknesses of 1-2-3. Those same conservative, cost-conscious microcomputer managers who have been buying IBM clones (but not Macintoshes) will buy a cheaper Lotus clone, but not Excel.

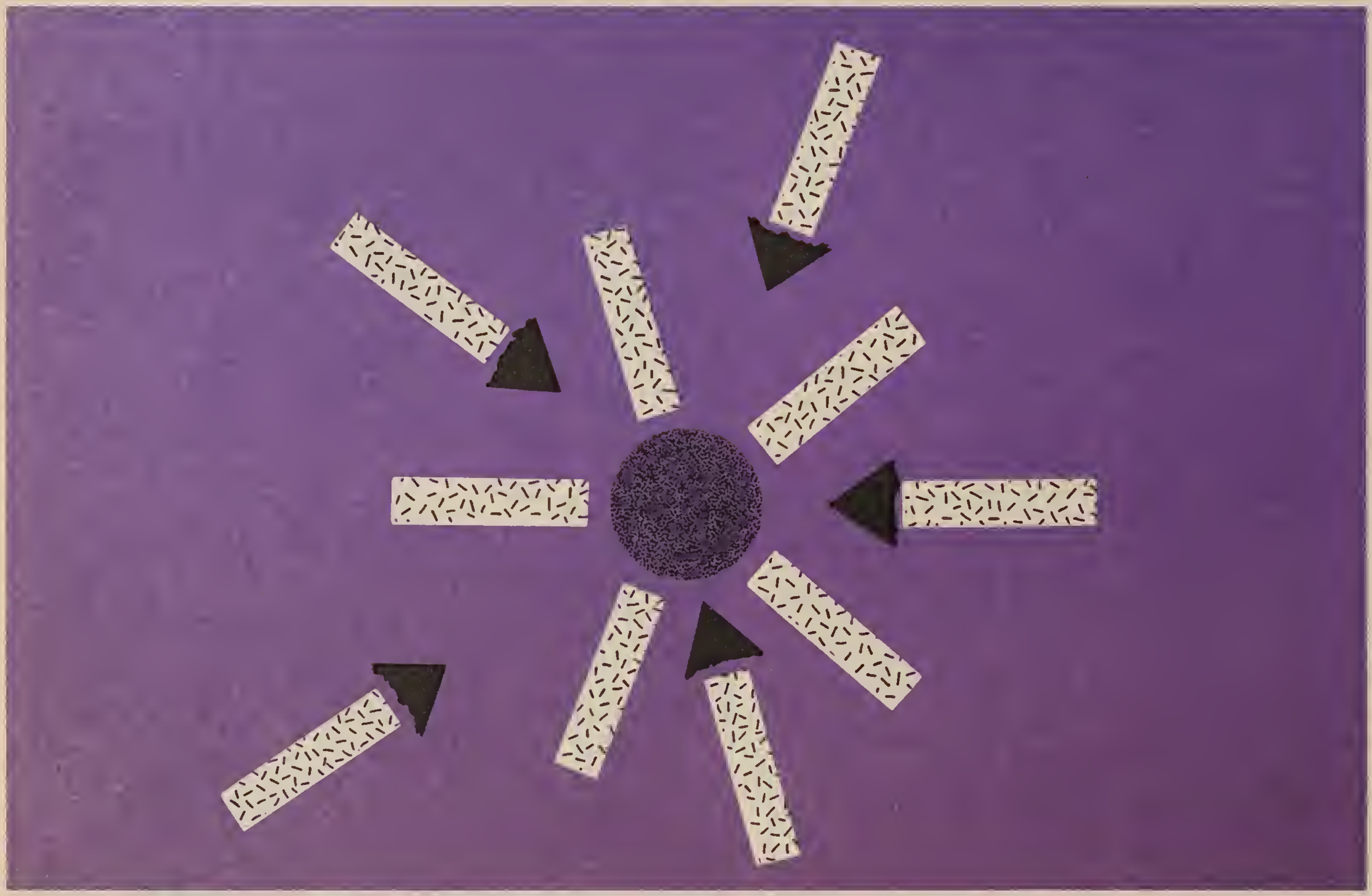
A reason to switch

If Microsoft made a mistake with Excel, it was in not building in the multi-interface flexibility that Philippe Kahn is beginning to strategically utilize with Borland products. Quattro provides a 1-2-3-style interface, an interface of its own and the added freedom to customize from there. If a new spreadsheet product can be positioned as a cloneable version of the industry standard, then the value-added functionality and flexible, user interface design becomes a reason to switch from the standard.

Otherwise, Excel falls into the category of products like Javelin, Q&A, Paradox and so many others. It is a fine product. It will be a successful product, particularly with those who are just now coming into the product category.

Let me put that more strongly: Are you using spreadsheets for the first time? Consider Excel. However, looking at the big picture, Excel will be, after all, just another spreadsheet product in a category where the decision makers have already cast their vote for 1-2-3.

Unless Lotus pulls a Visicalc and lets the product stagnate (which is possible but extremely improbable), there is just not enough value added to Excel to entice the comfortable 1-2-3 user into straying from home.



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SOFTWARE & SERVICES

SOFT TALK

Louis H. Bernstein

Training's image woes

Companies spend millions of dollars on computer hardware and software in search of a solution to a business problem. But hardware and software are only two of the three ingredients necessary for a smooth data processing operation. The third is trained people.

Data processing training typically amounts to less than 1% of the data processing budget. Are systems so advanced they run themselves without a trained staff?

Ask a systems manager whose homogeneous Vaxcluster starts acting heterogeneous. Or a programmer who wants to pick up a 10-page report and instead gets a box of paper with the same line printed 300,000 times.

Quest falls short

Without people trained in system management, our quest for information falls short. DEC's VMS is touted as a user-friendly operating system, and it is. It's approachable. Its commands are easy to learn. Utilities prompt the user, so little is forgotten.

But even VAX sites need to incorporate training as a regular feature of their operations. Why is so little attention paid to training?

It's possible to trace the shortcoming back to two sources. The sales agent, not wanting to jeopardize a sale to a new prospect, may oversimplify VMS, which, by the way, has more than 300 tunable parame-

Continued on page 23

Restructuring eases maintenance

Government test of product shows six programs take less time to modify

BY CHARLES BABCOCK
CW STAFF

ARLINGTON, Va. — A report on a test of a Cobol restructuring tool at the U.S. Defense Logistics Agency found that restructured programs take 44% less time to modify and 15% less time to test.

The report, sponsored by the Federal Software Management Support Center of the U.S. General Services Administration, reached that conclusion after testing six programs at the Defense Logistics Agency by running them through Recoder, a restructuring product from Language Technology, Inc. in Salem, Mass.

Recoder was selected because Language Technology was the only one of four companies that produces restructuring products to agree to a hands-off test, said Richard Harrison, director of the center. Mel A. Colter of Colter Enterprises in Monument, Colo., a researcher in the field of software maintenance, evaluated the results and wrote the 57-page report.

The Defense Logistics Agency provides contracting and supply services to the U.S. armed forces and runs a data center in Columbus, Ohio, where it maintains 9,600 programs representing 14 million lines of code, most of it more than 10 years old. One of the programs tested had been written following structured techniques. The other five had not.

Stands by results

Colter said he did not believe the study was extensive enough to conclude that restructuring will always yield a 44% decrease in maintenance time. But he added, "The chances of that high of an improvement being an accident are zip."

Colter acknowledged that the report did not consider "the human factor" in attempting to evaluate differences in the time programmers spent on code restructured by Recoder vs. programs that were not run through the product. The report made no attempt to pinpoint differences in skill among the programmers participating in the project, although they were not familiar beforehand with the programs tested. The report noted that many of them reacted negatively to restructured code the first time they encountered it, despite the improvement in maintainability.

Of the six programs, three showed no change in time needed to make changes. But two programs showed a 50% reduction, and a third showed a reduction of 62.5%, for an overall average of 44%, the report stated.

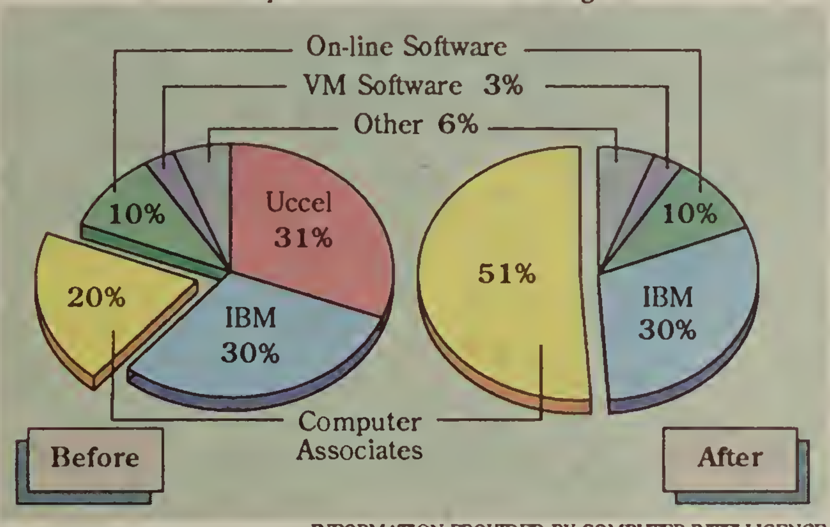
Restructuring tended to add to both the number of state-

Continued on page 22

Data View

Market share of security software

IBM and plug-compatible mainframes before and after Computer Associates-Uccel merger



INFORMATION PROVIDED BY COMPUTER INTELLIGENCE
CW CHART

Unit reduces message size

BY SUZANNE WEIXEL
CW STAFF

SUGARLAND, Texas — Data Packer/MSC, a data-compression product that reduces the size of messages transmitted over IBM's IMS/VS Multiple Systems Coupling (MSC) links, is being offered by BMC Software, Inc.

MSC is a standard feature of IMS/VS. It allows users signed on to one IMS system in the MSC network to enter transactions that execute in another

Continued on page 22

Link lets PC assume host tasks

BY ALAN ALPER
CW STAFF

LAWRENCEVILLE, N.J. — Multisoft, Inc. recently released a development system that allows a mainframe application with an IBM 3270 terminal interface to off-load its screen handling, error processing and other end user-associated functions to a personal computer.

Called Infront, the package allows a PC running a 3270 emulation board to capture field editing, interfield calculations and the logic of other end-user functions and process them on the PC instead of shifting such functions to the mainframe, where they are processed under normal 3270 emulation, Multisoft spokesmen said.

Infront works in conjunction with another Multisoft product, Super-Link, a mainframe-to-microcomputer communications facility that includes a fourth-generation language, screen generator and data base but does not offer advanced peer-to-peer linkage, Multisoft representatives said.

Infront will compete with other front-end development tools already on the market, including

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Inside

- Two versions of the MUMPS programming language for the VM operating system released. Page 23.
- T.A.P.I. Information Systems offers a manufacturing and process control system. Page 25.

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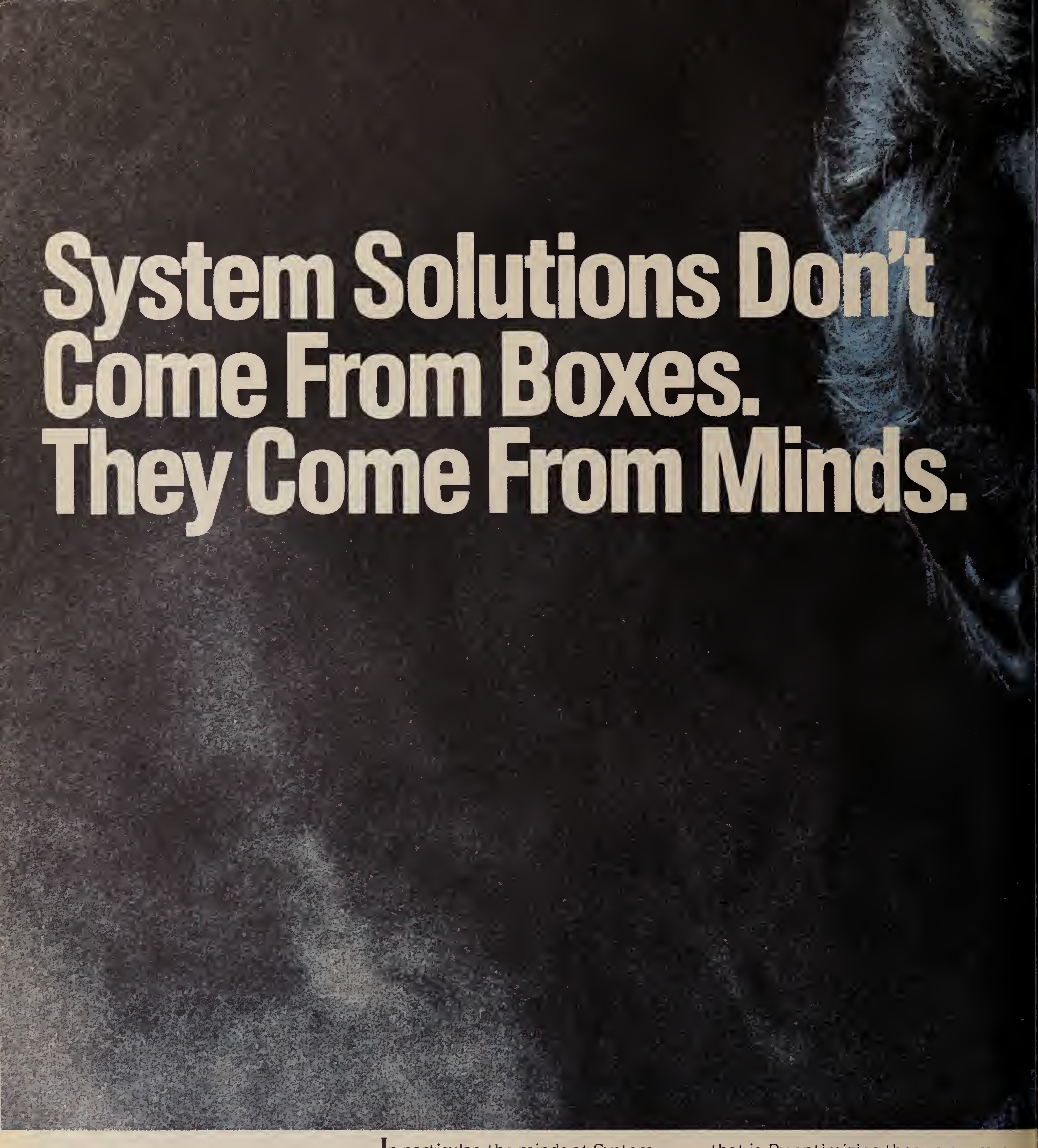
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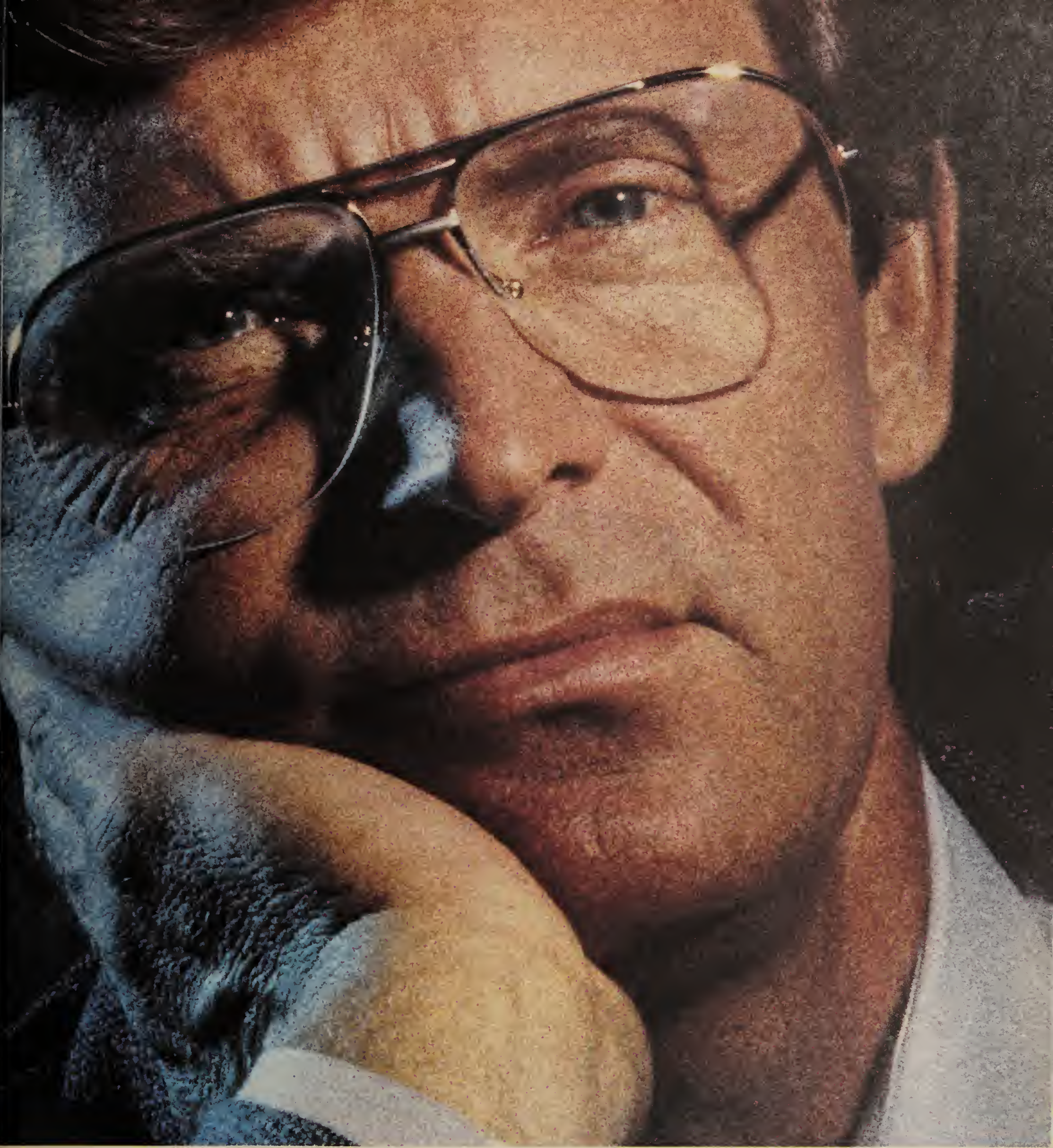

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Message size

CONTINUED FROM PAGE 19

system. Ideally suited for very large sites with extensive data bases, it can also be used for transferring data in sites with as few as two CPUs, BMC spokesmen said.

Data Packer/MSC compresses the size of a message up to 80% by reducing the number of bytes before transmission, the spokesman said. After it reaches its destination, the message is returned to its original form. Data passing through an intermediate system, however, is not expanded and recompressed.

Compression and expansion is supported for all segments, including scratch pad areas (SPA). User exits allow examination and modification of all non-SPA segments for outbound and inbound messages.

A key feature of the utility, the vendor said, is its ability to provide statistics on all messages without increasing the traffic load. The statistics can be used for defining buffer sizes and balancing traffic loads between IMS/VS systems. Independent compression and data accumulation functions make it possible to gather statistics without compressing the data.

Prices range from $12,000 to $32,000, depending on the CPU size. The package is available now.

Restructure

CONTINUED FROM PAGE 19

ments in a program and the number of lines of source code. The average increase in number of statements was 26.2% for the six programs, although the one written as a structured program showed a decrease of 30% in its number of statements. The average increase in lines of source code was 54%, with the figure ranging from 13% for the program written in structured code to 103% for one of the unstructured units.

Language Technology officials have acknowledged that Recoder adds to the length of programs by eliminating GO TO statements and creating new paragraphs of code. The style adopted in Recoder allows only one verb per line, and the product may use multiple physical lines to represent a single logical statement. Programmers, in confronting the results, criticized the output as "disjointed," with PERFORM verbs scattered and paragraphs added that had no names that were meaningful to a programmer.

The restructured programs showed an average 99% reduction in structure violations, with functional equivalency maintained in the restructured programs, the report said.

On average, the restructured programs showed a 37% increase in load module size after being run through an optimizing compiler. An average 9% more CPU time was required with the restructured programs, the report said.

The report also noted that "a significant number" of the target programs failed to run through Recoder on the first pass. Language Technology officials said the test was conducted with the first release of Recoder, which did not recognize certain Cobol patterns even though they fell within ANSI standards. Recoder is now on Release 4.2, and many more conventional patterns are accepted by the product, officials said.

Link

CONTINUED FROM PAGE 19

Aspen Systems, Inc.'s Enter/3270.

Infront is compatible with all IBM Personal Computers and compatibles running Microsoft Corp.'s MS-DOS and supports a wide variety of 3274 and 3278 emulation boards. An Infront developer's tool kit, including the mainframe-to-micro communications facility, lists for $1,500, while a stand-alone communications package is priced at $500.

Infront provides tools in order to build micro-software-like user interfaces with pop-up windows, multicolor backgrounds and context-sensitive Help screens for 3270-based transaction-oriented mainframe applications.

The package also enables users to access their mainframe applications via IBM 3270 emulation from their micros instead of conventional 3270 terminals, noted Ross Altman, marketing director.

Since all data is validated by Infront before it is sent to the host, data entry errors normally identified by the host are eliminated. This reduces host computer usage and remote communications costs, the company said.

The package contains a screen-capture module that converts 3270-type screen images into PC-like forms; a form-generator program to enable the developer to edit the captured screen images; a fill-in-the-blank component for defining common attribute setting and editing functions; a fourth-generation language to develop logic required for edits and PC data base activities and a source code debugger.

Altman said one potential customer, an insurance company, was interested in using Infront to modify "hundreds" of CICS production applications written in the early to mid-1970s that none of its programmers wanted to work on. "Infront would allow them to create a new user front end with easy-to-use enhancements without touching the CICS code," he explained.

MDC, Inc., a Detroit vertical market software developer, is using Infront to tie together applications that run on a variety of IBM operating enviroments and on non-IBM minicomputer environments as well.

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Two versions of MUMPS out

IBM and Intersystems Corp., a small Boston company, introduced versions of the MUMPS programming language for the VM operating system last month.

IBM will offer MUMPS/VM in January. Intersystems' M/VM is available now.

Both products will run on the full line of IBM 370 hardware under the VM operating system. MUMPS is said to be similar to Fortran or Cobol with its procedural orientation. In addition, it includes its own data management facilities and compiler. ANSI has established a standard for MUMPS.

"Featurewise, I can't say there's much difference" between the IBM and Intersystems Product, said Paul Grabscheid, a vice-president at Intersystems. "But ours is priced by the number of users, instead of CPU size."

The IBM version can be licensed starting at $12,570. Intersystems' licenses begin at $9,900.

This marks IBM's first MUMPS program offering. Intersystems has offered MUMPS since 1978.

Intersystems has sold 2,000 MUMPS licenses, most having gone out to Digital Equipment Corp. VAX users. About 100 licenses have been sold to Data General Corp. customers.

Dylakor releases programming tool

Works with firm's fourth-generation development systems

CHATSWORTH, Calif. — Sterling Software, Inc.'s Dylakor Division began shipping last month an IBM VM version of its programmming tool, Dyl-Online.

Dyl-Online is designed to work with the company's fourth-generation development systems, Dyl-280 and Dyl-280 II. It can access all standard IBM files and data bases, the company said.

Dylakor President Carole Morton claimed that when Dyl-Online is used with the company's fourth-generation language, it can cut programming time by as much as 50%.

The programming tool is a menu-driven, interactive product said to accommodate novice users as well as sophisticated programmers.

It includes a library facility, allowing users to build and modify private or general-access program libraries.

The software provides automatic syntax checking and error analysis, the company said. Dyl-Online will work with VM/SP Release 4.0 or higher.

A Dyl-Online license ranges in price from $6,000 to $21,000, depending on the system configuration.

Bernstein

CONTINUED FROM PAGE 19

ters. "How hard can it be?" the salesman asks. "It doesn't even need air-conditioning."

This approach sometimes finds a ready audience with upper management, which says, "We spent $150,000 for this system. It better do what it's supposed to do."

Other excuses we hear from companies not offering training include, "We're a small shop with only a couple of people" or "It's not in our budget" or "We send one person away for training, and he or she trains everybody else."

Another excuse is, "We're in the middle of a project and just don't have time." The latter is the toughest to swallow, because a few days of training could reduce errors in a project and allow it to finish in less time.

Remedying the reluctance to offer training can be difficult. An advocate of training in any organization is dealing with attitudes and egos that want to say, "This is how we do it" and what they mean is, "We do it without training."

Many companies, however, are slowly awakening to the fact that companies that train their people tend to keep their people. And these highly skilled workers become a major corporate asset.

DEC has been more aggressive in offering training to its customer base, and education-oriented companies are springing up to help with the task.

Ben Franklin once stated, "Empty the coins in your purse into your mind, and your mind will fill your purse with gold."

It was ol' Ben, of course, who 200 years ago discovered some of the principles that now power our machines.

Bernstein is president of Bernstein & Associates, Inc. in Atlanta, an installation and training firm for DEC systems users.

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NEW PRODUCTS

Systems software

A manufacturing and process control system called **MPCS** has been announced by **T.A.P.I. Information Systems, Inc.**

Designed for the IBM System/36, MPCS consists of subsystems for industrial management, customer order processing and purchase order applications. Each subsystem includes specific application modules that can interact with each other as a total system. According to the vendor, parametric definition is also available, enabling an automatic connection to an accounting system.

Features include customization and such transaction types as file attributes, processing logic and table parameters.

The system costs from $8,500 to $38,000, depending on the modules selected.

T.A.P.I. Information Systems, 85 Eastern Ave., Gloucester, Mass. 01930. 800-322-8274.

Applications packages

Version 5.0 of **Pacs Plus**, the resource accounting and chargeback software for Digital Equipment Corp. VAX/VMS users, has been announced by **Signal Technology, Inc.**

Version 5.0 is said to use on-screen visual operations rather than syntactical operations, allowing users to perform Pacs Plus resource accounting operations directly from form displays.

Other features include on-line Help, visual editing of any data collected in the summary file about system use and report writing.

Pacs Plus is priced from $3,200 on a DEC Microvax to $11,600 on VAX systems larger than the VAX 8550.

Signal Technology, 5951 Encina Road, Goleta, Calif. 93117. 805-683-3771.

NMC Technologies, Inc. has announced its **Accounts Receivable and Credit Collection** software package for use on the IBM System/38.

Features of the software include application of checks across companies and divisions; multiple chargeback and unapplied cash notices created per check; flexible multilevel dunning letter system; credit collection action display with notepad and tickler system; parent cash processing; split check processing; and cash forecast reporting.

The product is priced at $35,000.

NMC Technologies, Suite 103, 1314 Bedford Ave., Baltimore, Md. 21208. 301-653-9400.

Utilities

Britz Publishing, Inc. has announced the **Spool File Report Editor** for the IBM System/36.

Designed for editing spool-file entries, the software allows users to review and make changes in a spool-file entry. Features include the abilities to insert lines; to delete lines; to copy and move lines within a report; to shift margins left or right; to draw and erase boxes; to change the column length of a report; and to change the print density of a report.

Britz also announced the **MPG system** for the IBM System/38. The MPG system is a maintenance program generator.

The Spool File Editor costs $99. The MPG system costs $199. Both include source code.

Britz Publishing, 1814 Capital Towers, Jackson, Miss. 39201. 601-354-8882.

On-Line Documentation, Inc. has announced **Release 4.2** of **Help**, its on-line documentation package for CICS applications.

Help 4.2 is said to allow instantaneous access to field- or screen-level documentation with one keystroke of a user-defined PF key in either full screen or windows. Users may also update field- or screen-level documentation directly from the application screens, according to the vendor.

Other features include multilingual support, data dictionary interface, cross-reference features, on-line map definition and multiple-level narratives.

Help costs $9,955 for a single CPU DOS version and $12,995 for an OS version.

On-Line Documentation, Suite 436, 20503 Yorba Linda Blvd., Yorba Linda, Calif. 92686. 714-970-6124.

Development tools

Whitesmiths, Ltd. has ported its host-resident **CXDB** interactive C source-level cross debugger to the Motorola, Inc. MC68000 family of processors.

CXDB allows embedded 68K-byte programs to be debugged in terms of the original C source code on Digital Equipment Corp. VAXs and IBM Personal Computers. It does not require user access to the actual target hardware.

Other features allow the user to execute host system commands; print the contents of a C variable function or file with or without assembly language display, create log output and set and remove breakpoints.

Prices for CXDB range from $1,800 to $7,000.

Whitesmiths, 59 Power Road, Westford, Mass. 01886. 617-692-7800.

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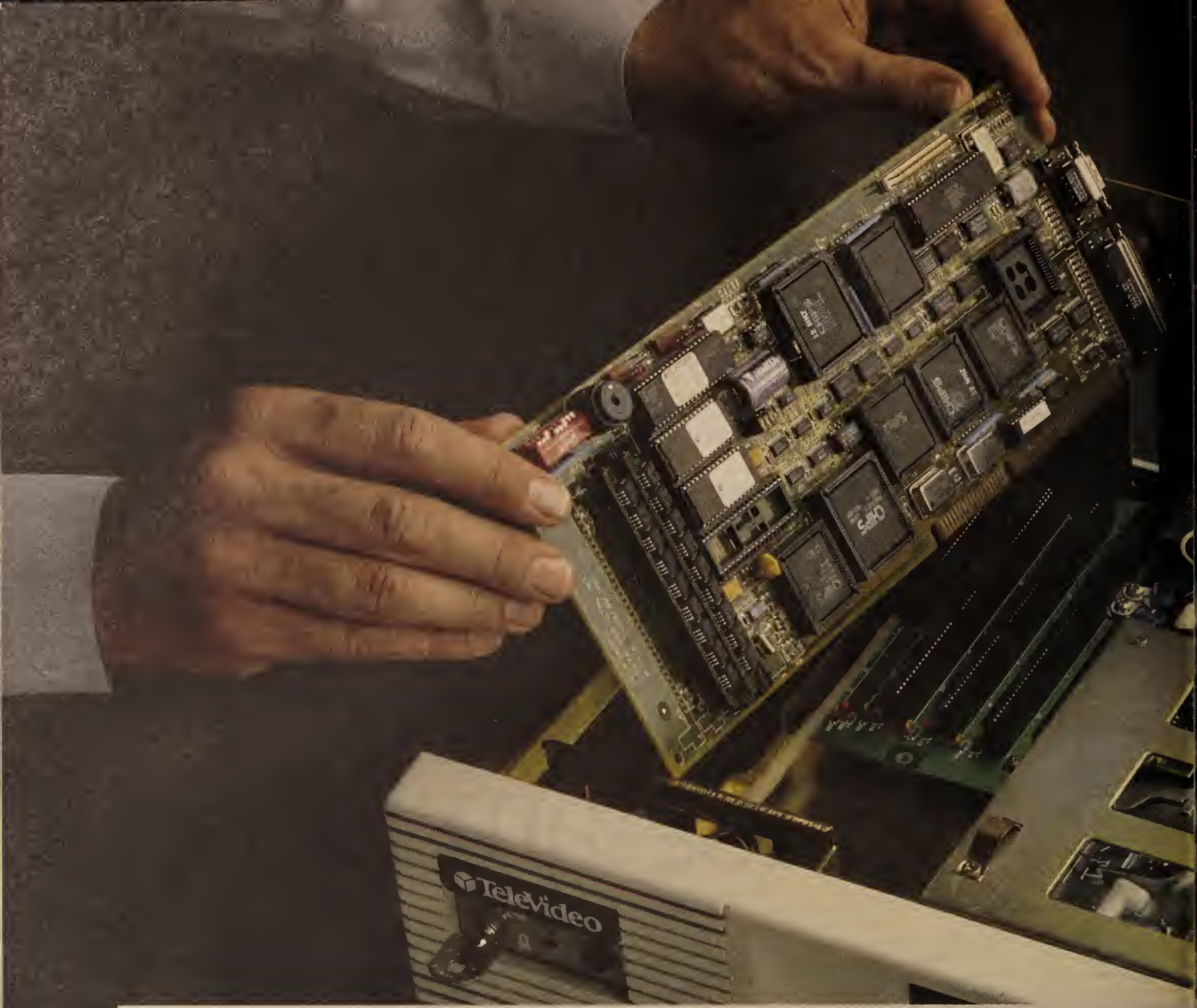

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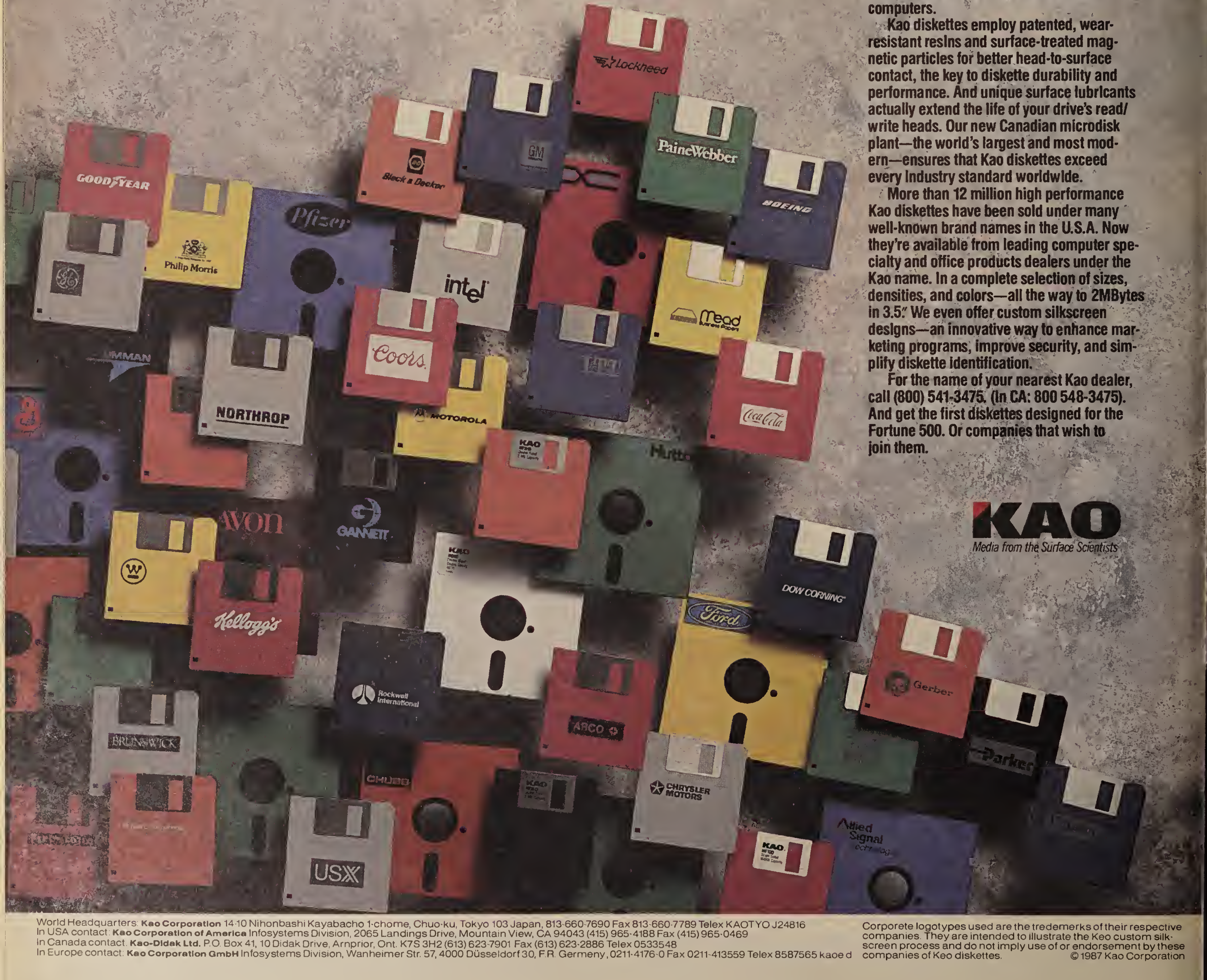

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MICRO BITS

Douglas Barney

Who's afraid of OS/2?

Ain't no big deal, Mac! Rick Richardson, national director of microcomputer technology for Arthur Young, is not exactly impressed with IBM's plans to ship a large-memory mulitasking operating system with a graphics user interface next fall. Richardson already has most of these features on Apple Macintoshes, which outnumber IBM PCs 15-to-1 at Arthur Young.

"The kind of stuff we are getting, we get about a year and a half before everybody in the PC market gets it. They don't have Hypercard yet. They will get their Presentation Manager, and everything will be getting up and start working, and then they'll be where we were about 2½ years ago," Richardson says. While the Mac may not be for everybody, Richardson has few reservations about his decision to standardize on the machine. "I can't complain about being that far ahead," he says.

Speaking of OS/2. Those contemplating implementing OS/2 better get ready for some big headaches, according to Jeff Tarter, publisher of "Soft-

Continued on page 39

Oracle for OS/2 crystalizes

Multitasking data base development environment expected by January

BY DOUGLAS BARNEY
CW STAFF

BELMONT, Calif. — Data base applications developers running out of steam under Microsoft Corp.'s MS-DOS may get some relief in January when Oracle Corp. ships Oracle Version 5.1 for Microsoft's MS OS/2.

The vendor of SQL-based data base products said it will ship the version as early as possible to give its customers a taste of MS OS/2's large memory multitasking capabilities.

"We have some people who want it right away. They are the early adopters," said Gene Shklar, director of marketing for Oracle's PC product line. Many of these users are interested in how OS/2 performs and are also interested in developing large micro-based applications, he said.

Oracle already markets Professional Oracle, which breaks the 640K-byte MS-DOS limit. In Professional Oracle, the firm used its own techniques of addressing the memory problem, while the MS OS/2 version relies on the operating system's large memory capabilities. Oracle has shipped some 18,000 copies of Professional Oracle, most of which were purchased for $199 as part of a special promotion.

Unlike Professional Oracle, the MS OS/2 product will provide multitasking capability. With multitasking, a user will be able to simultaneously run one application that gathers data, one that generates reports and one for ad hoc queries.

Oracle 5.1 will include a Lotus Development Corp. 1-2-3-like spreadsheet, SQL Calc; SQL Forms for applications development; SQL Report for report writing; SQL Plus for ad hoc queries; and Pro C, a processor for language applications programs.

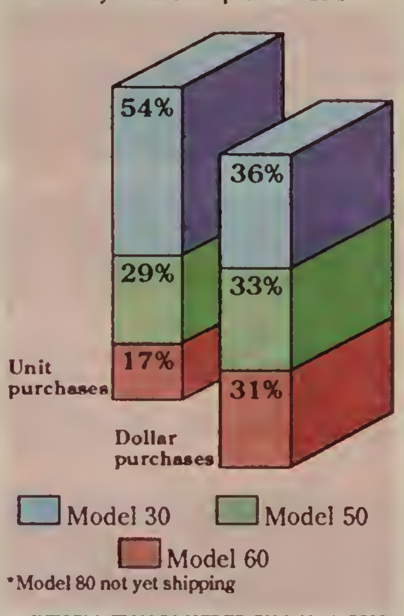
In addition to its upcoming

Continued on page 40

Data View

IBM PS/2

*Store purchases by units and dollars for second-quarter 1987**



*Model 80 not yet shipping

INFORMATION PROVIDED BY IMS AMERICA
CW CHART

PC package summarizes data from multiple sources

NEW YORK — Corporate Class Software announced last week a $90,000 executive information system (EIS) that allows executives to access internal corporate information and external data in the form of customized reports.

Designed for use with the company's Fastar financial reporting and analysis software, Fastar EIS runs on IBM Personal Computers and compatibles under Microsoft Corp.'s MS-DOS or IBM's PC-DOS 2.1 or higher. It supports local-area networks from 3Com Corp. and Novell, Inc. as well as the IBM Token-Ring network.

According to Corporate Class Software President Richard J. Lyons, Fastar EIS pulls data from the company's existing financial data base and automatically updates reports based on changes made in Fastar data. The system includes a tool kit — featuring an icon builder, a background maker that attaches library icons to a function and an application builder — for building interfaces and reports.

A key feature of Fastar EIS, Lyons said, is that it allows executives to electronically access the supporting data behind any set of numbers in a report.

Continued on page 40

Firms join to clone Model 30

BY JAMES A. MARTIN
CW STAFF

PHOENIX — VLSI Technology, Inc.'s Application Specific Logic Division recently announced that it will develop, with Oak Technology, Inc., an IBM Personal System/2 Model 30 chip set aimed at the OEM market.

With this announcement, VLSI became one of several suppliers to announce a chip set for the Model 30, which is the only member of the PS/2 family that does not contain IBM's proprietary Micro Channel architecture, making it the easiest to clone.

Thus far, the Model 30 has been the best-selling PS/2 model. Many observers have said the system, which is a cheaper, faster clone of the IBM Personal Computer XT with better graphics and a 3½-in. drive, will continue to sell well in the market.

VLSI said initial samples of the chip set will be available late

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Inside

- Microsoft's Gates talks about an integrated development environment. Page 33.
- Aston-Tate's Folk looks into Dbase's future. Page 33.
- Qume releases desktop publishing system. Page 42.

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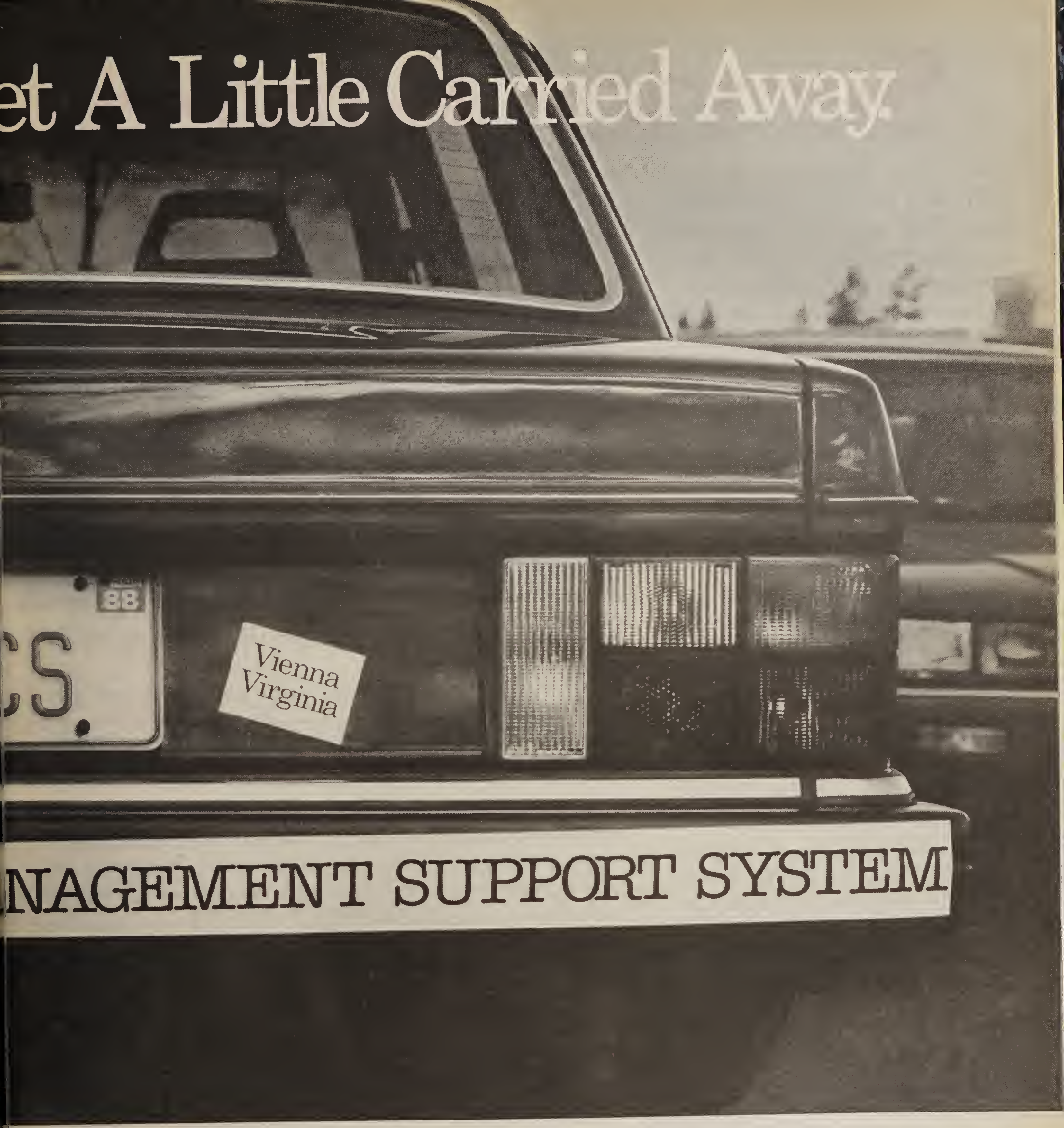

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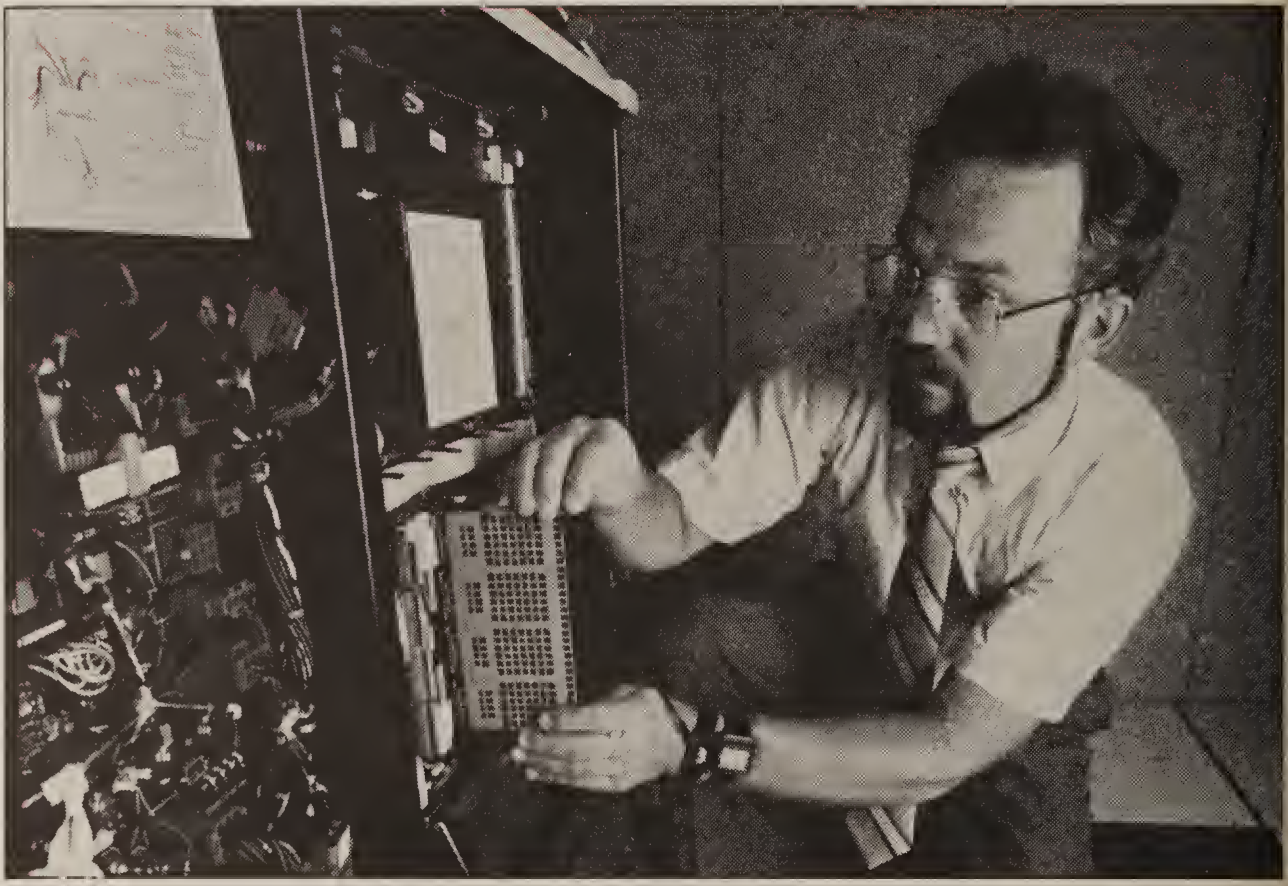

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CCWK30

SMALL TALK

William Zachmann

Hercules ups card ante

Back in the early days of IBM Personal Computer and compatible use — 1982, that is — Hercules Computer Technology was founded to try to sell a better mousetrap. Well, okay, so it wasn't a better mousetrap, but a better monochrome graphics card. It was simply better than what IBM or anybody else had to offer at the time.

The Hercules Graphics Card offered text and graphics far superior to IBM's old Color Graphics Adapter (CGA). The CGA's 320- by 200-pixel three-color resolution was never good for much of anything. Reading text from the CGA was a matter of counting the dots. And the Hercules 720- by 348-pixel monochrome graphics made the 640- by 200-pixel monochrome graphics on the CGA look pathetic.

So except for masochists like me, who were so enamored of color that we ruined our eyesight reading CGA text, most normal people who really wanted to do anything with graphics opted for Hercules's better mouse . . ., er, ah, monochrome graphics card. It helped, of course, that Hercules took the trouble to convince Lotus to support the Hercules Grapics Card for Lotus's 1-2-3 graphics.

The result was that Hercules managed to sell more than

Continued on page 37

Gates sees need for simplified coding

This is the final installment of a three-part series by Bill Gates, chairman of Microsoft Corp., on the evolution of computer language technology.

Although the Microsoft Quick line and similar products have simplified life for general users by integrating the cycle of program creation and revision, and although the future holds much promise for additional improvements, major enhancements for professional developers will have to be significantly different.

Text editors are a case in point. The simple integrated environments of the Quick line include a built-in easy-to-use text editor. Most professional programmers prefer more sophisticated text editors with a number of built-in functions. (Like other applications described in an earlier article, some text editors have sophisticated macro languages of their own to aid program development.) Any integrated environment for serious programmers must support the ability to include the programmer's preferred text editor.

ROBERT BURROUGHS/GAMMA LIAISON

Bill Gates *wants to see the pros' lot eased*

Professional developers — roughly defined as those who build large-scale scientific, engineering or business applications — have more complex needs and require more sophisticated systems to work on than general users do. They will require language products with fast prototyping capability up front and leading-edge code optimization at the end. They will, like general users, require an easy way to dynamically manage all of the now-separate steps of editing, compiling, linking, running and testing code. Automation of module management is more critical and the tools required have to be more sophisticated.

Solving these problems is not a matter of adding a few features here and there. The scale of the problem is so large that the development process must be viewed in a radi-

Continued on page 41

Voice-entry system helps save lives but can't golf

Kurzweil, emergency room doctor develop medical tool to aid in high-stress diagnoses

BY JULIE PITTA
CW STAFF

WALTHAM, Mass. — The next time you are examined in an emergency medical room, you may find that your doctor has abandoned manilla folders for a computer.

Using a system called VoiceEM that was developed here by Kurzweil Applied Intelligence, Inc. with help from an emergency room physician, doctors can enter data verbally into a computer system.

Priced at about $26,000, the system consists of a voice data-entry system attached to an IBM Personal Computer XT compatible manufactured by Wyse Technology, Inc. It is currently being shipped to hospital emergency rooms.

Arthur Chambers, director of emergency medical services at Nash General Hospital in Rocky Mount, N.C., helped Kurzweil develop VoiceEM. A computer novice, Chambers became involved in the project after seeing VoiceRAD, an earlier Kurzweil product that also uses voice technology for radiological reporting.

"I thought it had incredible opportunity for clinical medicine," Chambers said. "But I didn't know whether it would work with sirens, screaming babies and the kind of noise you get in an emergency room.

"The acid test was in the department," he added.

Fine-tuning

Chambers worked with Kurzweil for three-week periods that stretched over five months, telling Kurzweil engineers what he would require for a voice-entry emergency room.

After the product was completed, he received the first system for use at Nash.

After using it for three months, Chambers explained, he has been able to use the system for approximately 90% of the cases he receives. "There are some things that are too complex for the system," he conceded. "Cases where you need to include input from a number of different parties — police-type cases."

Voice recognition

The system, which has a 1,000-word limit, must recognize the user's voice to enter data.

A physician must enter all 1,000 words twice into the system in order to be recognized by it. Other parties cannot access the system, according to Chambers.

In its three months of use at Nash, Chambers said, the system has proved to be a time saver.

Triggering responses

"Trigger Phrase" is a feature that allows a doctor to enter one-word or single-phrase diagnoses and receive in return detailed descriptions.

For example, if a doctor says to the machine "eyes normal," the screen prints an itemized list of each part of the eye that is clear. The doctor may then alter the text, detailing portions of the eye that are injured or diseased.

Included in the Trigger Phrase features are ailments that are common to a hospital emergency room, such as auto accidents, headaches and throat disorders. After the doctor completes his report, he can print out the data for inclusion in the patient's chart.

Ashton-Tate exec sees SQL opening doors for Dbase

IN PERSON

With nearly two million copies of Dbase sold, Ashton-Tate Corp. has a clear deed to today's microcomputer data base market. But that market is in for some radical changes as the large-memory OS/2 operating system emerges from IBM and Microsoft Corp., as IBM ships its proprietary micro data base, as Lotus Development Corp. jumps into the fracas and as SQL rises in prominence.

Computerworld Senior Editor Doug Barney recently spoke with Ashton-Tate Executive Vice-President Roy Folk about satisfying the needs of Dbase users, including MIS's strident demands for SQL.

Why is it that some current users of Dbase are interested in SQL?

From the MIS perspective, there is a desire — and the whole of Oracle's business is built on the desire of people — to use lower level or distributed configuration solutions to solve problems that used to be solved by adding expensive time-sharing terminals and extra processing power to avoid declining response time. MIS is saying, "I need an SQL solution now. We have got to write an application that involves access to my mini or mainframe; I know SQL is the way to do that."

What do you believe are some misconceptions concerning your SQL plans?

We are going to have a complete SQL, a full version of SQL.

We intend that SQL, as we implement it, will be usable to query SQL-based host data bases. It is true that there are two parts: One is the language; the other is the communications code and protocols. Maybe we don't have the communications links to DB2 in the first release, as an example. But the full SQL will be implemented. The communications code may have to evolve over time because that code, in some degree, is dependent on the host software.

Connectivity appropriate to DB2 on a mainframe is different from that appropriate to a VAX or System/36.

Roy Folk

To say that we will have all those connectivity solutions at first release is bolder than anyone can do. We will certainly have a full SQL that, as those connectivity solutions become implemented by us as well as the mini and mainframe vendors, will allow our SQL and the code written in our SQL to be usable.

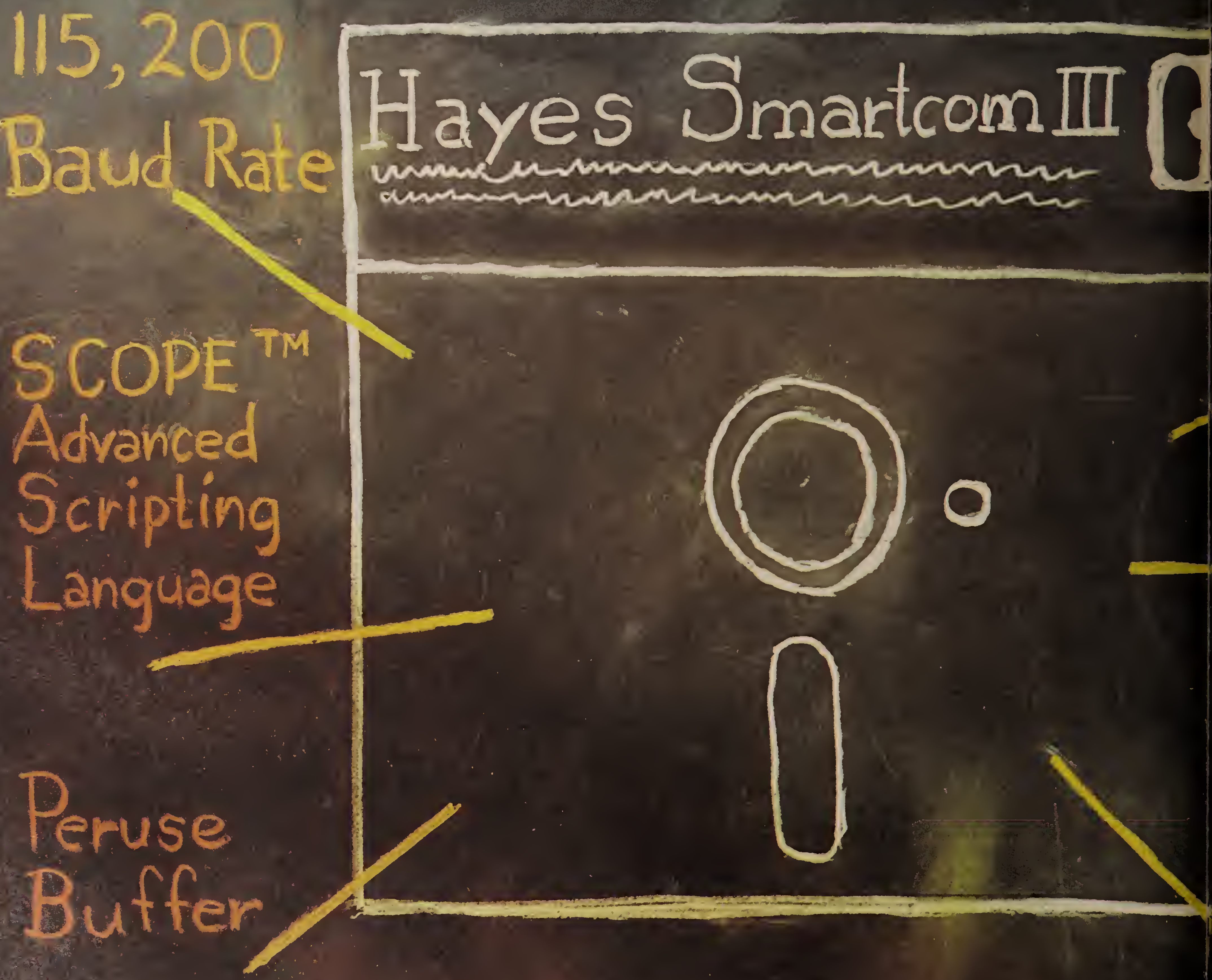
We will not have all of those solutions available with the first release. No one does. Oracle doesn't. But the SQL foundation on the workstation is definitely the right one. Also, we do unions and joins.

Is there any user interest in programming Dbase with other languages, such as C?

Generally speaking, no. I believe that standardization of Dbase as a language that is good unto itself is becoming a stronger and stronger factor. Rather than people saying, "I want another language besides Dbase," we hear people saying, "Bring more

Continued on page 40

THIS TIME WE OUTSMARTED



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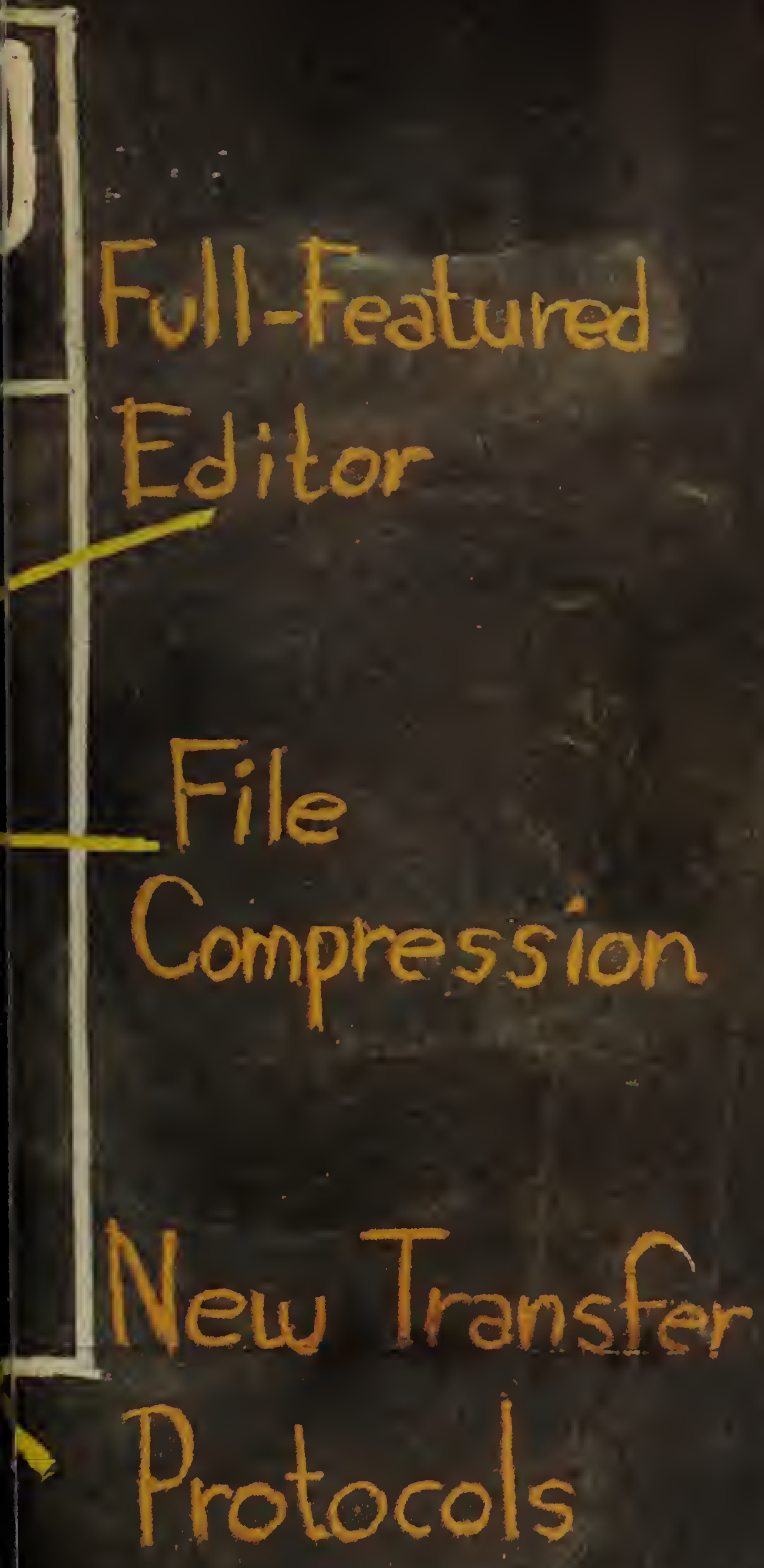

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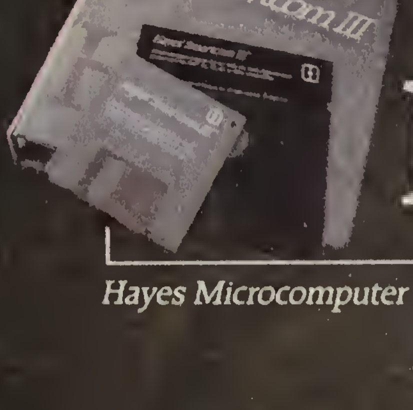

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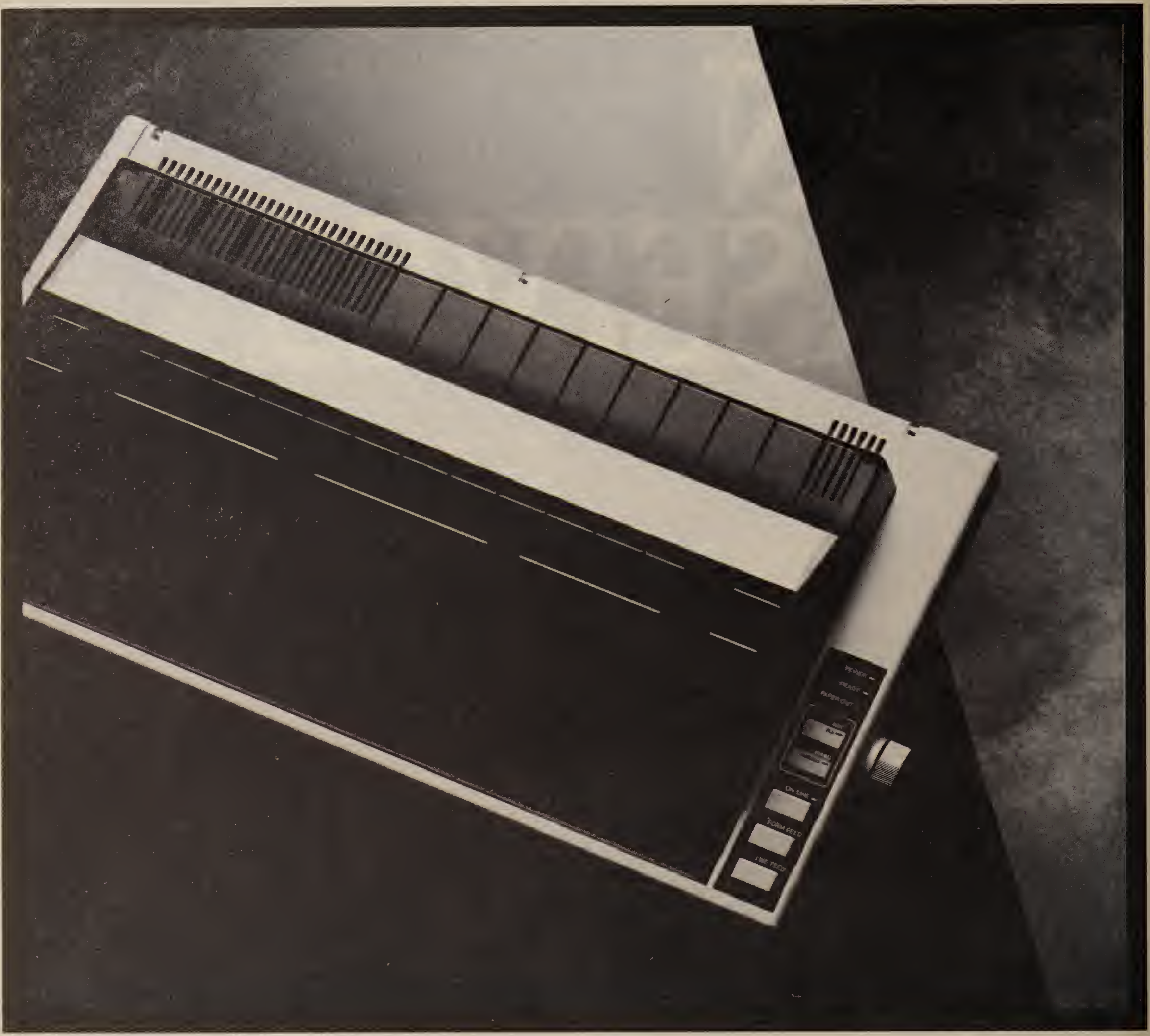

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Barney

CONTINUED FROM PAGE 29

letter." Tarter says OS/2's potential pitfalls include the agony of retraining users, implementing the operating system across a variety of PC clones, upgrading hardware, upgrading a huge number of software applications and — horror of horrors — multitasking systems crashes. You may see users in open rebellion and MIS directors looking for new careers with the Department of Public Works if this scenario plays out.

FAPIulous software. One of the smoother ways to move to OS/2 is being pitched by Lotus and, according to one source, Ashton-Tate. Both 1-2-3 and Dbase are being rewritten as Family API, or FAPI, applications, which will run under both Microsoft's MS-DOS and OS/2. With this approach, users buy one package they can initially run under MS-DOS. When it comes time to move onto OS/2, they do not need to upgrade. Sounds good, except these applications do not take advantage of OS/2's more advanced and esoteric functions.

Excel-sent: Microsoft has finally (it was a bit late) shipped its would-be Lotus 1-2-3 killer and is already boasting of its early successes. According to Microsoft, firms that have already placed orders include Citibank, Hughes Aircraft, General Dymanics, Raytheon, Arthur Andersen, Manufacturers Hanover Trust, Fidelity Investment Services and The Equitable.

Dbase Help. Tom Rettig Associates in Beverly Hills, Calif., has help for frustrated users of Dbase, Dbase compilers and tools. Rettig, the first child star of the popular television series *Lassie*, recently unveiled Tom Rettig's Help, a pop-up on-line reference guide that assists users of Dbase and its assorted dialects. Users can invoke the program over a program editor or word processing program while writing a Dbase application, look up commands and pass the correct command syntax into the program. But don't run out to buy it just yet. The product will not be available until early next year.

Now this is different. Some struggle to make MS-DOS easier to use and others strugggle to make Unix more friendly. Now comes Vegacon Corp. in Convent Station, N.J., which intends to replace the MS-DOS command interface with a nearly complete Unix Korn shell called PC-SH. So instead of using MS-DOS commands, a user could employ the Unix syntax. Although this might strike some as a step backward, especially with the rise of user-friendly interfaces, the firm says Unix commands are more powerful and flexible than those found in MS-DOS. So for those who understand Unix syntax and are frustrated by some of the limitations of MS-DOS, this might just be the ticket.

Barney is a *Computerworld* senior editor, microcomputing.

Zachmann

CONTINUED FROM PAGE 33

half a million Hercules Graphics Cards by the middle of the decade and establish what amounted to The Standard for IBM PC and compatible graphics. In the process, the company grew like blazes.

That was then, of course, and this is now. Not only the 640- by 350-pixel 16-color resolution of the IBM Enhanced Graphics Adapter (EGA) but also the new 640- by 480-pixel IBM Video Graphics Array (VGA) offer greatly superior alternatives to the old CGA. For a while, it wasn't clear how Hercules would respond.

The Hercules Incolor Card introduced this summer, however, should keep Hercules effectively in the running, despite the growing momentum for the VGA (and EGA). List priced at $499, the Incolor Card is a standard half-slot card that brings 16 colors (from a palette of 64) to the 720- by 348-pixel resolution of the original monochrome Hercules Graphics Card.

While the Incolor Card obviously blows by the 640- by 350-pixel EGA resolution, it would seem at first glance that IBM's new 16-color VGA 640- 480-pixel resolution (available even before IBM's April 2 announcements from vendors like Video Seven with multiscanning monitors like NEC Home Electronics' Multisynch) has an advantage over the Hercules product. However, the Incolor Card has some significant advantages that keep it in the running.

The first of these is the virtual standard that the original monochrome Hercules card established and the big installed base it achieved. Software written to support the original 720- by 348-pixel monochrome resolution of the earlier product can be moved rather nicely to the newer Incolor Card.

The result is that lots of software is already available that is readily adapted to take advantage of the Incolor Card. From Lotus's 1-2-3 and Symphony to products like Autodesk's Autocad and Microsoft's Windows, there is no lack of products to take advantage of Incolor Card's high-resolution color.

Equally if not more important, however, is the unique ability of the Incolor Card that goes under the trademark of Ramfont. Just as the original Hercules Graphics Card excelled in providing easily readable text characters in addition to higher graphics resolution than IBM's CGA offered, so the Incolor Card excels in character mode as well.

Ramfont does more in text mode than just provide very high-quality, readable characters on the screen. Ramfont gives you 3,072 programmable characters from which to choose instead of the standard 256-character set. The result is a display adapter that makes it possible, in high-speed character mode, to do what approximates true "what-you-see-is-what-you-get" screen displays normally possible only through much slower graphics displays. This makes the Incolor Card a particularly attractive alternative when used with a product like Lotus's Manuscript.

While it may not be the ideal product for everyone, the Hercules Incolor Card is well worth considering, especially if you are already familiar with the original Hercules Graphics Card or can make use of the Incolor Card's excellent text quality and versatility.

Zachmann is vice-president of research at International Data Corp.

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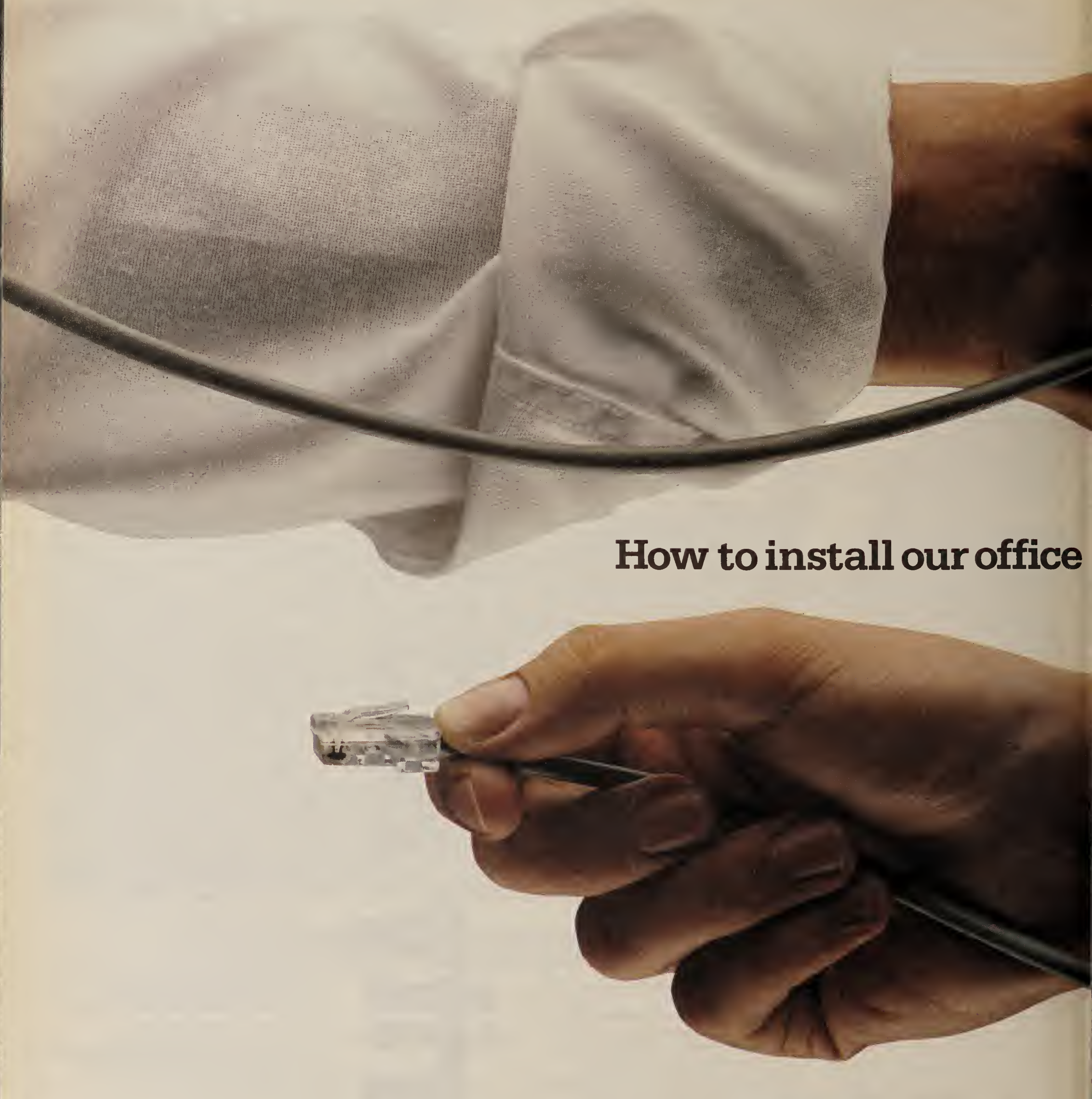
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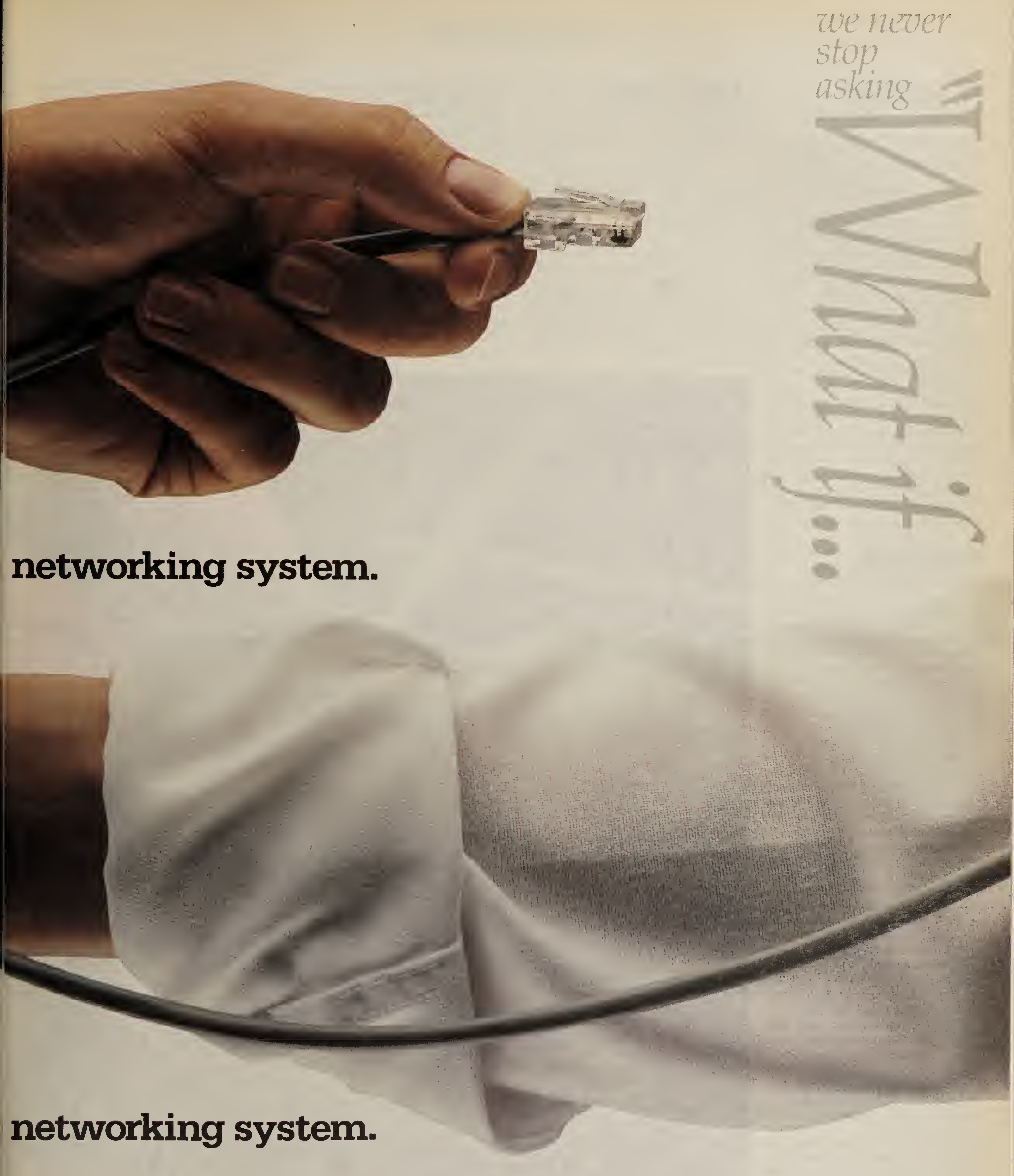

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PC package

CONTINUED FROM PAGE 29

"Fastar EIS is a mainframe application that just happens to run on personal computers," Lyons said. "It supports a distributed data processing environment for management reporting."

In addition to accessing the Fastar data base, direct access to data stored on a mainframe or minicomputer is supported, as is the ability to import data from such application programs as Lotus Development Corp.'s 1-2-3, Lyons said.

Included in the price is the Fastar system, support for 15 simultaneous users, documentation, installation, training and consulting.

Corporate Class Software also announced Fastar Consolidation, a financial analysis and reporting application that allows corporations to consolidate division-level information into corporate reports. Software located at headquarters would include controls for the input of document formats, accounts, reporting entities and types. Fastar Consolidation for 20 to 40 users costs from $80,000 to $110,000.

Firms join

CONTINUED FROM PAGE 29

in the first quarter of 1988, which would be several months behind competing chip sets that are expected from Chips and Technologies, Inc. and Western Digital Corp., among others. No schedule was announced for PS/2 Micro Channel-compatible chip sets, although a VLSI spokesman said it "would be logical to assume" that VLSI will enter that market.

"We won't be the first in the PS/2 market. We'll more likely be in the middle somewhere," said Joseph C. Fowler of VLSI. "But we can give an OEM company a significant advantage in that the chip set's modular design allows us to modify the chip for each customer's demands. Our strength is in the standard cell and compiler arena, and that's the key to making this work."

VLSI announced an IBM Personal Computer AT chip set in May, well after the market was established by Chips and Technologies. "There's really no hurry, because there's still a lot of life left in the AT," Fowler said.

VLSI's PS/2 Model 30 chip set will include support for the Lotus/Intel/Microsoft Expanded Memory Specification 4.0 and IBM's Video Graphics Array standard. Pricing was not announced.

Oracle for OS/2

CONTINUED FROM PAGE 29

OS/2 product, Oracle is developing a version to run on Apple Computer, Inc.'s Macintosh under both Unix and the Macintosh operating system. Oracle is also planning implementations on Sun workstations and the OS/2 Presentation Manager graphical user interface, Shklar said.

In addition, Shklar said, Oracle "will support all major high-level protocols."

Oracle 5.1 requires an IBM Personal Computer or compatible Intel Corp. 80286-based machine with OS/2. It will sell for $1,295, but qualified OS/2 developers can purchase the product for $199, an Oracle sales representative said.

Ashton-Tate

CONTINUED FROM PAGE 33

into Dbase, like SQL, so we can make it a fundamental language."

How do you accomplish making Dbase a standard language across machines?
A major step is to add SQL to Dbase. That is going to open up the whole world of transparent connectivity — that plus some other things.

Also, keep Dbase competitive, with respect to certain functional additions. The next step is to make connectivity happen through SQL to a variety of existing data base software products.

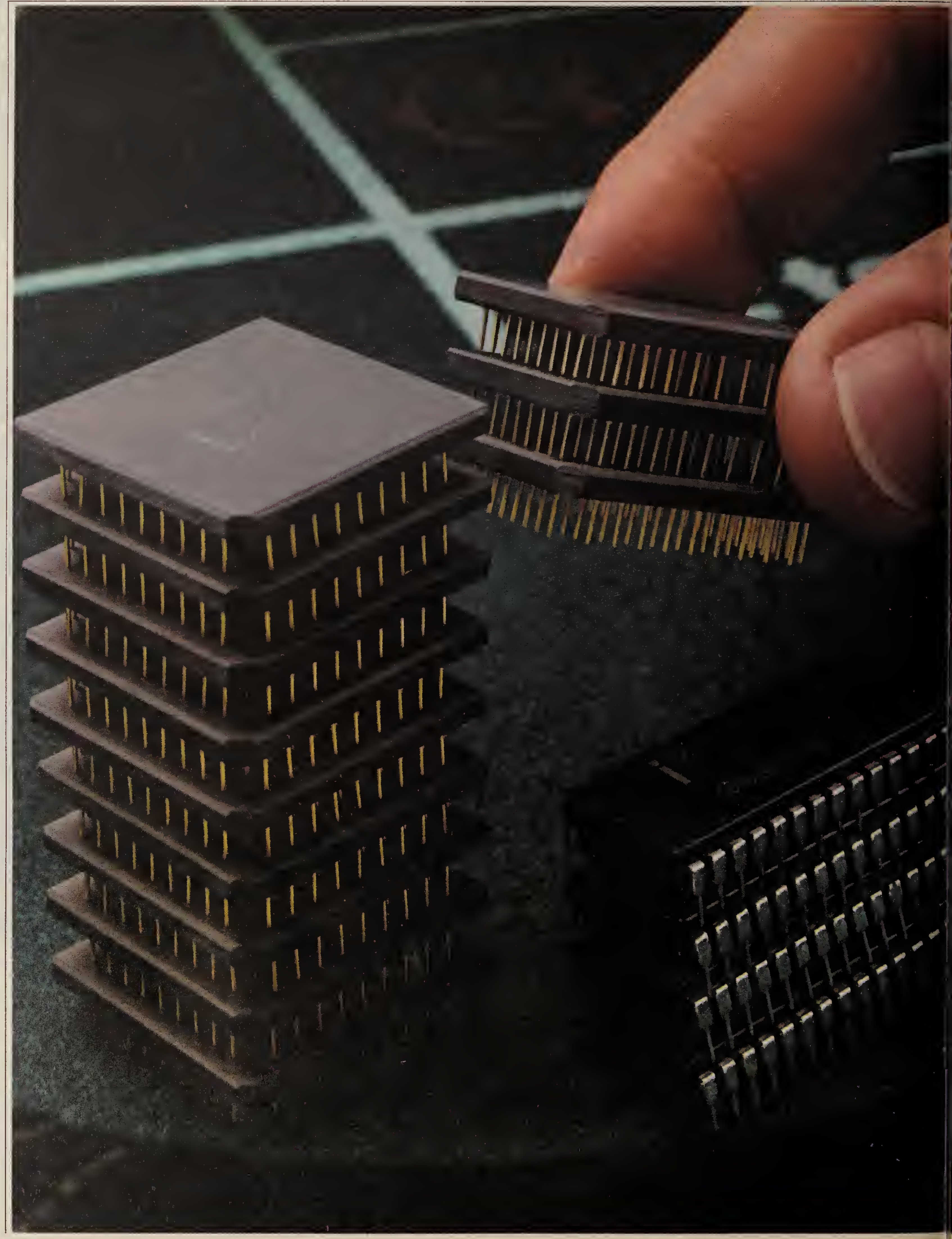
Is there any interest in Unix?
In terms of Unix as a standard for productivity applications, there isn't one. If AIX on PS/2 starts to sell in large volumes, it might be in our interest to move our product to that.

What are your plans for exploiting other architectures, such as IBM's 9370?
We are increasingly aware of other architectures and would be foolish not to be very aware of VAX and Microvax.

And we are very concerned with being a significant part of the connectivity solutions of the future, which means proliferating Dbase/SQL, the language, onto a number of popular mini and mainframe data bases.

What features other than SQL are users looking for?
Most Dbase users want a faster interpreter and compiler. That desire has spawned the so-called Dbase clone compiler market segment. People want transparent data access from their micros to existing data bases on minis and mainframes.

Because Ashton-Tate does not preannounce products, the firm has left itself open to potshots from competitors. Are we going to see Ashton-Tate come out fighting?
You will see a splash, a noise, explosions, sirens — all that stuff — when we are ready to ship, because that is when it counts the most.



Gates

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cally different context.

For example, where the general user tends to use one or, at most, two languages, professional developers must contend with multiple languages on the same projects, for several reasons:

- One particular language may do a certain task best. Assembler, for example, is almost always used in time-critical code.
- A certain routine may already exist in one language and not in another.
- For general programming, individual programmers on a team may prefer different languages.

In this environment, developers must be able to easily write and debug programs written in multiple languages and to jump quickly from one context to the next. In the future, an integrated development environment will include smart tools that will work across all languages. Editors, MAKE facilities, debuggers, dynamic help features and forms generators are obvious possibilities.

Integration lacking

A number of tools now exist to help professional programmers, but they are just that — separate tools. A new environment must be created that will accomplish the following objectives:

- Allow developers to switch easily from one tool to another.
- Incorporate new tools.
- Improve the reliability of the overall development process and the resulting software.
- Allow for the variety of development methods required by programming tasks and individual programming styles.

One way of approaching the problem is to view the process of programming — from start to finish — as project management, with coding being just one part of the project.

This is not a new concept; on mainframes and superminis, a considerable body of project management software exists. Much of it, however, tends to impose a programming style on developers and, as a result, has not always been successful. That is, it does not get used. The key is to allow for individuality while keeping track of key information.

One way to do this is to create an integrated development environment that allows tools to be mixed and matched as needed and to create a program data base, a set of information shared by all tools in the development environment and organized so that key information can be analyzed and tracked.

A program data base will make compilers more efficient by storing more information about the programs being written.

Wouldn't it be great if a compiler could optimize a program and analyze the initial results, then reoptimize based on what it learned the first time so that the final code was even smaller and faster? A smart compiler is possible if it has access to a sophisticated program data base.

Such a program data base would also allow automatic management of the connections between modules for better program reliability. Many of the pieces exist; the key is to have them all share information and work together.

The effect of standards

Other improvements in technology will interact with improvements in language technology to further enhance the development environment. Today, connectivity is limited for program development. Cross-compilers exist, but a great deal of additional work is forced on the programmer by differences among environments and by both programming and applications interfaces.

Growing standardization in the area of languages, application interfaces and networking protocols will simplify these tasks. As tools become more standardized, programmers on personal computers will be able to prototype applications intended for ultimate use on mainframes and superminis. Tighter integration of software development across architectures will occur, and programming resources — both software tools and people — will be much, much easier to share.

Enormous improvements in programmer productivity will result and could dramatically shrink the product backlog that exists in programming shops. Developers will use improved programming tools to add more features to each upgrade and to turn out more products faster.

The future is now

Some of the capabilities outlined in this article are being delivered now. Microsoft's new Quickbasic 4.0 and QuickC, for example, feature highly integrated development environments for the general user. Recent Microsoft language releases have been integrated with the firm's Codeview debugger, which can be used to debug multiple languages at the same time.

But these are just the first steps. Microsoft's MS-DOS does not have the facilities required to support a common macro language. An ideal programming language could evolve under MS-DOS, but it is likely to share many of the characteristics of the common macro language and to emerge under Microsoft's MS OS/2.

MS-DOS can support an integrated development environment based on a simple programming model: one language, one editor and a simple debugger. But a truly integrated development environment for professional programmers will require multitasking and large chunks of memory; again, something that is available under MS OS/2. The language improvements made during the last year are just a hint of what the future holds.

Three years ago Intel was so excited about ISDN, they bet their chips on it.

In 1984, the technology for ISDN wasn't yet available. And Intel's customer application of ISDN, through Mountain Bell —a US WEST Company—and AT&T Network Systems, wasn't even slated to begin until February, 1987.

But one of the world's leading microchip manufacturers saw the potential of ISDN to link its offices in California, Oregon and Arizona at higher levels and economies of integration. To handle data traffic from a variety of networks and computers at each site.

So Intel, which already supported ISDN as an industry standard with a special set of semiconductor chips, decided to emulate ISDN on its existing networks, and made an early corporate commitment to migrate towards ISDN.

Today, that commitment is paying off. In field trials, Intel has been sending voice and data simultaneously over ordinary Mountain Bell telephone lines using the AT&T 5ESS™ digital switch to support PC networking and provide fast file transfer between the company's ETHERNET local area networks.

"Combining the bulk of our voice and data traffic on the same twisted pair wiring will save us considerable money because we do not need to run coax cable through the plenums, buildings and corridors," said Don Melvin, Intel corporate telecommunications manager.

"The ISDN network we're building today will allow us to integrate voice and data, not only in our T1 network, but also in our digital switches right to the desk, and extend switched data routes to the computer host," he added.

"We need to have the global digital connectivity end-to-end which ISDN brings us, and we want to be able to make use of its shared bandwidth on demand without having to do manual patching."

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NEW PRODUCTS

Systems

Pagelink, a desktop publishing system, has been released by **Qume Corp.**

Pagelink is a self-contained hardware and software system designed to allow merging of text and graphics from existing word processing and spreadsheet programs to produce typeset-quality documents.

Designed for the IBM Personal Computer environment, Pagelink allows up to nine users to share a single laser printer, the vendor said.

Features include 111 built-in fonts, plug-in font cartridges and the ability to create page frames, shades, patterns and overlays. It is also said to let the user incorporate scanned images into documents. Software enhancers allow automatic kerning, optimized character spacing and typesetting functions.

Pagelink costs from $3,795.

Qume, 2350 Qume Drive, San Jose, Calif. 95131. 408-432-4000.

A portable IBM Personal Computer AT compatible based on the Intel Corp. 80286 microprocessor has been announced by **IMC International, Inc.**

The system, called the **Portable Office**, comes standard with a 40M-byte hard disk, a 1.2M-byte floppy disk, 640K bytes of memory, parallel and serial ports and six expansion slots. It features a backlit LCD with a resolution of 640 by 200 dot/in. and an 80-char. by 2-line display. It weighs about 20 lb.

IMC's *Portable Office*

The Portable Office costs $3,295.

IMC International, Northwood Executive Park, 10 Northern Blvd., Amherst, N.H. 03031. 603-595-2336.

The **Daemon** line of 32-bit Unix coprocessors has been designed as an alternative to 16-bit Xenix and Unix for personal computer users by **Unixsys International, Inc.**

Daemon consists of an add-in 32-bit coprocessor board, an AT&T Unix System V port and a real-time I/O executive. Other features include 1M or 2M bytes of memory, a memory management unit, a floating-point processor, demand paging and a device driver library.

Daemon is priced at $2,000 for the 1M-byte version and $1,300 for the 2M-byte version.

Unixsys International, Suite 210, 4340 Almaden Expwy., San Jose, Calif. 95118. 408-978-1144.

Software applications packages

A document-control program called **WPcontrol** has been announced by **Unlimited Processing, Inc.**

WPcontrol is said to locate and access any document, then use a single keystroke to load a word processing system with that document ready for editing or printing. Features include the ability to keep track of documents and retrieve them using partial information by subject, name, where sent, when written and written by whom.

In a local-area network environment, WPcontrol is said to provide the ability to manipulate any document in any stage of development or revision.

WPcontrol costs $195 as an added application to the vendor's Team-Up and $295 as a stand-alone package.

Unlimited Processing, Suite 8, 8382 Baymeadow Road, Jacksonville, Fla. 32216. 904-731-8330.

Scoring Credit, a personal computer-based credit checking program, has been announced by **Le Ford Software.**

Scoring Credit is said to be capable of creating a score based on data drawn from credit application forms. If the score meets the user's criteria, the program can automatically request and score applicant credit histories from credit bureaus.

Scoring Credit runs on IBM Personal Computers and compatibles. It costs $1,200.

Le Ford Software, Suite C, 612 Hampton Drive, Venice, Calif. 90291. 213-399-5511.

An enhanced version of the **Slidewrite Plus** presentation software package has been announced by **Advanced Graphics Software, Inc.**

Version 2.0 features what-you-see-is-what-you-get text editing, up to 250 characters per line of text, custom floating-legend placement, up to 4,000 points per graph and advanced scientific and engineering capabilities with polynomial curve fits and error bars.

Also included are three-dimensional and overlapping bars; mouse support; basic macro capability; subscripts and superscripts; zoom and pan; rotating text, graphs and drawings; and the ability to place any graph of any size in any location on the page.

Slidewrite Plus can be used to produce overhead slides, 35mm slides and hard copy using IBM Personal Computer compatibles. It costs $345.

Advanced Graphics Software, Suite 105, 333 W. Maude Ave., Sunnyvale, Calif. 94086. 408-749-8620.

PC:/Filer 1099, software for use in reporting Internal Revenue Service Form 1099 information via magnetic media, has been announced by **CDM Data Management, Inc.**

The menu-driven software supports all the 1099 series, Forms 1098, 5498 and W2-G. It can be used for multiple filers, forms and diskettes and has the capability of printing Form 1099 hard copies for distribution to payees.

PC:/Filer 1099 also has file utilities for data review, checksum balancing and backing up data files.

It runs on Microsoft Corp. MS-DOS or IBM PC-DOS-based computers and costs $279.

CDM Data Management, P.O. Box 241113, Charlotte, N.C. 28224. 704-553-2740.

Software utilities

Version 4.0 of the fixed-disk organizer **Menumaster Excel** has been announced by **Luthin Development Corp.**

Enhancements include password protection on each option and menu screen; a screen saver that works automatically after three minutes of nonactivity; no control break allowed from inside the menu system; limited exit from DOS; and a menu-control language that allows a user to create batch files directly within a menu.

Other features include the ability to develop up to 999,000 menu screens, each containing up to 17 entries and two colors; creation of separate menus for each user; and a Help utility.

The single unit price of Menumaster Excel Version 4.0 is $69.95.

Luthin Development, Suite 15, 2709 Art Museum Drive, Jacksonville, Fla. 32207. 904-396-7720.

An add-in for Lotus Development Corp.'s 1-2-3 that allows creation of customized data-entry forms has been announced by **Goldata Computer Services, Inc.**

The software, called **Dave**, allows 1-2-3 users to create forms or images by painting them on the screen and specifying editing criteria for each data field, the vendor said. Images can be 10 pages in length and can contain 256 fields.

A Verify option allows the user to check existing work sheets for edit violations; Output options allow printout to screen, disk file or printer.

Dave is priced at $149.95.

Goldata Computer Services, 2 Bryn Mawr Ave., Bryn Mawr, Pa. 19010. 215-525-1036.

Pagemaker Portfolio: Designs for Business Communications, a package of 18 templates for use with the vendor's Pagemaker software, has been announced by **Aldus Corp.**

The software comes with predesigned page formats for proposals, memos, overhead transparencies, reports, handbooks and business plans. Also included is a manual providing instructions for incorporating text, charts and graphics into any of the templates.

Pagemaker Portfolio runs on Apple Computer, Inc. Macintoshes and IBM Personal Computers and works with output devices that are compatible with Adobe Systems, Inc.'s Postscript, the vendor said.

The package costs $99.

Aldus, Suite 200, 411 First Ave. S., Seattle, Wash. 98104. 206-628-2352.

A mathematical library package for the Turbo Pascal programming language has been introduced by **Acro Technology, Inc.**

The package, called the **Acrotech Turbo Math Library**, includes more than 300 functions for applications including unit conversion, trigonometry, statistics, mensuration, screen driver, physics, matrix primitives, matrix evaluations and general math. It comes with source code, a manual and the vendor's Scicalc demonstration calculator.

Also included are complex fast Fourier transforms, complex Gaussian elimination, integration and derivation techniques, matrix inversions, matrix multiplications, polynomial evaluations and Lorentz transformations.

The Acrotech Turbo Math Library costs $39.95.

Acro Technology, 1111 W. El Camino Real #331, Sunnyvale, Calif. 94086.

Development tools

Out of the Blue, a program-development system for IBM Personal Computers and compatibles, has been announced by **Paragon Software Corp.**

Out of the Blue is a full-function editor said to use standard features such as word processing, inserting and deleting text, DOS format for files, extensive search-and-replace capabilities, scrolling and block editing. According to the vendor, users can compile a program without leaving the editor.

Also included is a personalization module for defining screen colors and editing commands.

Paragon's Out of the Blue program-development system is priced at $69.95.

Paragon Software, 600 Rugh St., Greensburg, Pa. 15601. 412-838-1166.

Headstart, a business data base application, has been announced by **Digicorp.**

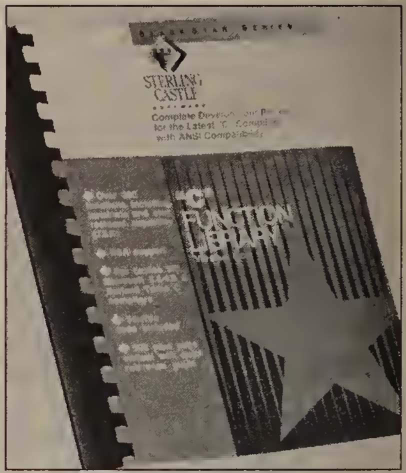
Designed for use with Ashton-Tate Corp.'s Dbase Mac data base for Apple Computer, Inc.'s Macintosh personal computer, Headstart is said to allow programmers to use Dbase Mac to develop products for personnel management, sales, marketing, accounts receivable, accounts payable and inventory.

Headstart costs $169.

Digicorp, 6925 Union Park Center #145, Modvale, Utah. 84047. 801-562-2227.

Software enhancements

An enhanced version of the **Blackstar C Function Library** for IBM Personal Computers has been announced by **Sterling Castle Software.**



The C Function *Library*

Version 4.0 is said to support enhanced graphics adapter standards and allow terminate and stay resident, or TSR, program development. It has six additional serial communications functions.

Version 4.0 is compatible with the Microsoft Corp. Version 3.0/4.0 C compiler as well as with the Lattice, Inc. Version 3.0 C compiler. Features include device handlers for screen, graphics, keyboard, printer and mouse and the capabilities of interrupts, string, menu, date, time and system functions.

Version 4.0 of the Blackstar C Function Library is priced at $125.

Sterling Castle Software, Suite 174, 702 Washington St., Marina Del Rey, Calif. 90292. 213-306-3020.

An enhanced version of the memory-resident productivity package for personal computers, **Tornado**, has been announced by **Micro Logic Corp.**

The new version adds a one-dimensional 365-day calendar with unlimited space for daily notes, a template for project planning and the ability to make printed graph paper-like grids. A Library option includes a cross reference for major cities,

states, area codes and time zones as well as a phone call coding convention.

Tornado runs on IBM Personal Computers and Personal System/2s. It costs $79.95. Upgrades from the earlier version cost $30.

Micro Logic, 100 2nd St., Hackensack, N.J. 07601. 201-342-6518.

Mindwork Software has enhanced its **Mindwriter** outliner with integrated word processing for the Apple Computer, Inc. Macintosh.

Mindwriter 1.1 includes a search-and-replace capability to support the Maclightning desk accessory spelling checker, additional keyboard commands for touch typists, support for Appleshare and other network servers and an automatic file backup option.

Mindwriter 1.1 is priced at $295. It runs on the Macintosh 512KE, Mac Plus, Mac SE and Mac II.

Mindwork Software, Suite 555C, 100 Pacific St., Monterey, Calif. 93940. 408-375-1531.

An enhanced version of the KDS frame-based expert system shell with blackboard for IBM Personal Computers and Personal System/2s has been announced by **KDS Corp.**

According to the vendor, **KDS3+** can produce an additional 8,000 rules of the form "If A and B, then C and D." Each rule occupies no more than 8 bytes of random-access memory and is automatically placed in the optimum sequential order.

Other features include the ability to read data from Lotus Development Corp.'s 1-2-3 .WKS files at runtime. Each module can have up to 24,000 rules.

KDS3+ costs $1,495.

KDS, 934 Hunter Road, Wilmette, Ill. 60091. 312-251-2621.

Insight Development Corp. has added support for the Hewlett-Packard Co. HP 7475A and Colorpro printers to its **Laserplotter** software program.

Laserplotter is said to allow users of Microsoft Corp.'s MS-DOS to output applications programs to laser printers instead of to plotters. It accepts the high-resolution vectors used by plotters and converts them into the raster-oriented bit-mapped image required by the laser printer.

Laserplotter costs $150.

Insight Development, Suite 140, 1024 Country Club Drive, Moraga, Calif. 94556. 415-376-9451.

Training

SCO Xenix Tutor, an interactive Microsoft Corp. MS-DOS- or IBM PC-DOS-based program said to provide hands-on automated training for Xenix users has been announced by **The Santa Cruz Operation, Inc.**

SCO Xenix Tutor is a self-paced training course that emulates a real Xenix system. On one-half of a split screen, it displays instructions to the student; on the other half, it emulates the Xenix system.

The five-module course features graphics in either color or monochrome as well as computer animation.

It can track the progress of up to 10 students through any number of breaks in the training sequence.

SCO Xenix Tutor costs $195.

The Santa Cruz Operation, P.O. Box 1900, 400 Encinal St., Santa Cruz, Calif. 95061. 408-425-7222.

Data storage

A tape cartridge backup system for IBM Personal Computers and compatibles has been announced by **Origo International.**

The **Origo Model 1701** fits into a half-height floppy disk drive slot. An external, portable model is also available. According to the vendor, disk backup is performed at 5M byte/min with a capacity of 60M bytes per tape cartridge.

Individual files, groups of files, directories or full hard disks can be backed up. An integral clock utility permits unattended backup at preprogrammed times.

Software provided with the Model 1701 is read- and write-compatible with IBM 6157 tape utilities.

The Model 1701 costs $1,095.

Origo International, 7921 Canoga Ave., Canoga Park, Calif. 91304. 818-340-7552.

The **Escalator** series of mass-storage subsystems for the IBM Personal System/2 Model 50 has been announced by **TW Technologies, Inc.**

The Escalator series includes the ST45-50, featuring the proprietary DK50 adapter and a 45M-byte, 28-msec internal hard disk drive for slide-in use with the PS/2 Model 50.

The ST45-50 kit costs $1,395.

TW Technologies, Suite A2, 21636 N. 14th Ave., Phoenix, Ariz. 85027. 602-581-0669.

A 45M-byte, 28-msec hard-disk subsystem for the IBM Personal System/2 Model 50 has been announced by **Rodime, Inc.**

The subsystem, called **Double Play**, was designed to replace IBM's 20M-byte drive. It features a 3½-in. drive with an average seek time of 28 msec.

All cables, interface boards, controllers and brackets for its installation into the Model 50 are included.

Also included is an interface board that permits users to salvage the 20M-byte drive and install it in the PS/2 Model 25.

Double Play is priced at $899.

Rodime, Suite 214, 29525 Chagrin Blvd., Pepper Pike, Ohio 44122. 216-765-8414.

Printers/Plotters/Peripherals

Laserboard, a plug-in board with a 250K-byte buffer said to allow three personal computers to share a Hewlett-Packard Co. Laserjet II printer, has been announced by **Digital Products, Inc.**

The fully enclosed Laserboard features job setup control that automatically adds users' custom print codes before each job.

It also has a printer reset control, which returns the printer to office standards after every printer request.

Other features include form-feed options and the ability to prioritize print requests, the vendor said.

Laserboard costs $495.

Digital Products, 108 Water St., Watertown, Mass. 02172. 617-924-1680.

Navarone Industries, Inc. has introduced the **ST Image Scanner** for the Atari Corp. Atari ST system.

The ST Image Scanner is an interface used with the Canon U.S.A., Inc. IX-12 scanner to input photographs, graphics and technical drawings into the Atari ST computer. It is compatible with Fleet Street Publisher by Mirror Soft, Ltd., Publishing Partner by Softlogik Corp. and Easy Draw by Migraphic, Inc.

The ST Image Scanner comes with scanner, interface, cable and software for $1,239.

Navarone Industries, Suite 201, 1043 Stierlin Road, Mountain View, Calif. 94043. 209-533-8349.

Board-level devices

A 2M-byte memory expansion board for IBM's Personal System/2 microcomputers, Models 50 and 60, has been announced by **Everex Systems, Inc.**

The memory board, called the **RAM II 2000**, is said to be fully compatible with IBM's Memory Expansion Option and to fit into one of the Micro Channel slots. The RAM II 2000 uses 1M-bit dynamic random-access memory chips. It supports expanded memory, extended memory and dynamic memory relocation.

Software provides Lotus/Intel/Microsoft Expanded Memory Specification compatibility and a print spooler.

The RAM II 2000 costs $399 with no memory installed.

Everex, 48431 Milmont Drive, Fremont, Calif. 94538. 415-498-1111.

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As you may know, the Informix® line of SQL-based RDBMS products gives you full portability across VMS,™ UNIX,™ MS™-DOS and networked systems.

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Dallas	10/20
Denver	10/16
Detroit	9/16, 10/15, 11/10, 12/9
Hartford, CT	10/6
Houston	11/6
Indianapolis	11/5
Los Angeles	8/3, 9/14, 10/28, 11/18, 12/8
Menlo Park, CA	11/5
Memphis	10/22
Minneapolis/ St. Paul	10/29
New Orleans	10/14
New York City	8/5, 9/16, 10/14, 11/18
North Jersey (Woodbridge)	8/19, 11/5, 12/2
Philadelphia	10/6
Phoenix	11/4
Pittsburgh	10/8
Portland	10/6
Raleigh, NC	10/27
Salt Lake City	10/15
San Francisco	8/5, 9/16, 10/14, 11/18
Seattle	8/7, 9/9, 10/7, 11/5, 12/2
St. Louis	10/20
Tampa	10/7
Washington, D.C.	8/7, 9/9, 10/7, 11/5, 12/2
Canada	
Montreal	10/19
Ottawa	10/20
Toronto	8/19, 11/5, 12/2
Vancouver	10/8
International	
Bonn	10/16
Frankfurt	10/15
London	10/13, 11/13, 12/3
Munich	10/6, 11/9, 12/1
Paris	10/8, 11/11, 12/2

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The RDBMS for people who know better.

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If you don't buy you'll miss

If you're looking for a good way to judge personal computers, a simple question will do: "What's in it for me?"

In the case of the IBM Personal System/2 family the simple answer is, "a great deal."

For openers, each model offers higher performance levels thanks to a "balanced system" approach for making things work together. Components were designed not just to coexist but to bring out the best in each other. So, for example, many of the programs you're using now and a wide range of other DOS applications will run up to 150% faster on the IBM Personal System/2 than on previous IBM PCs, depending on the model, of course.

Things that are optional on other PCs are standard on the Personal System/2–like advanced graphics, parallel and serial ports and more. And advanced IBM technology brings new levels of reliability and data protection.

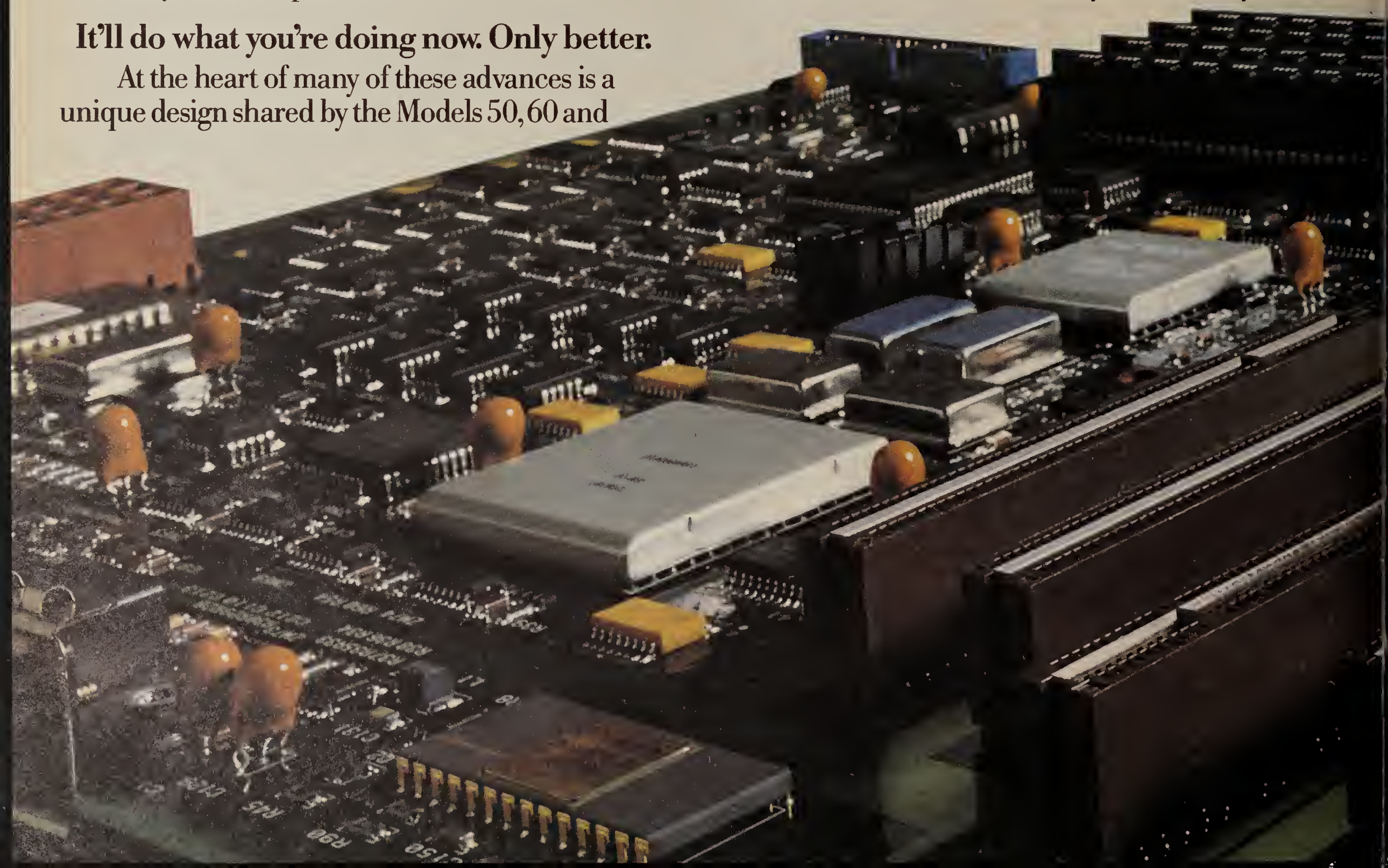
It'll do what you're doing now. Only better.

At the heart of many of these advances is a unique design shared by the Models 50, 60 and 80 of the Personal System/2 family. Technically it's called parallel bus architecture. We call it Micro Channel. But you can think of it simply as a superhighway with lots of fast lanes and bypasses. It allows data to flow faster and more efficiently, reducing the chance of information bottlenecks in the system.

What's more, the Micro Channel architecture not only makes it easier to speed information throughout the system, it also makes it easier to install peripherals and expansion cards in the system. There are no more DIP switches to set. It's all done electronically and automatically and, therefore, a great deal more reliably and easily.

Feature cards in your system can even transfer data directly to memory, via Micro Channel, leaving the microprocessor free to do other things.

The design of the Micro Channel also provides a faster, more efficient way to connect your



an IBM PS/2,
the bus.

system to other IBM Personal Systems, local area networks, minicomputers and mainframes.

It'll do what you want to do tomorrow. Only better.

Micro Channel architecture also gives the IBM Personal System/2 something else that's surprisingly rare in personal computing: the ability to improve with age.

One of the main reasons the architecture was created, after all, was to get the most out of IBM's new operating system, OS/2. And together they'll unleash the power of the 286 chip in the Personal System/2 Models 50 and 60 and the 386 chip in the Model 80.

With IBM Operating System/2 you don't have to be a "power user" to run several programs at once. You can prepare a presentation while your system recalculates a spreadsheet and gets data from a mainframe. And with a future edition of OS/2, you'll be able to share all this information with others on a local network or over mega-distances. Vast memory and host processor resources will be more accessible. And software will do more things more easily.

So catch the Micro Channel bus and you're on the fast track to higher performance, exceptional expandability and greater reliability tomorrow, as well as today.

For more data about the IBM Personal System/2, call your IBM Marketing Representative or visit an IBM Authorized Advanced Products Dealer. For the dealer nearest you call 1-800-447-4700.

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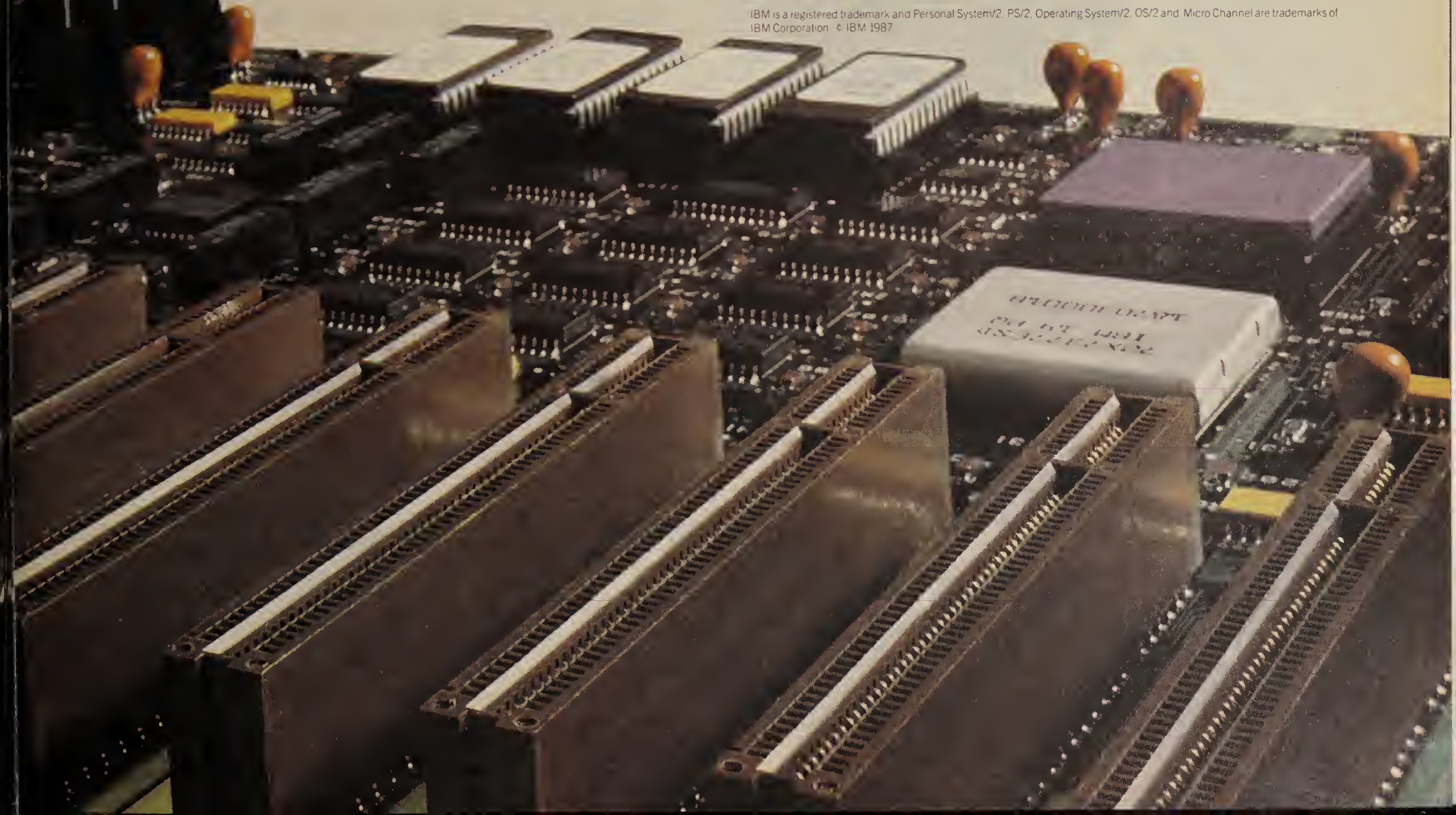
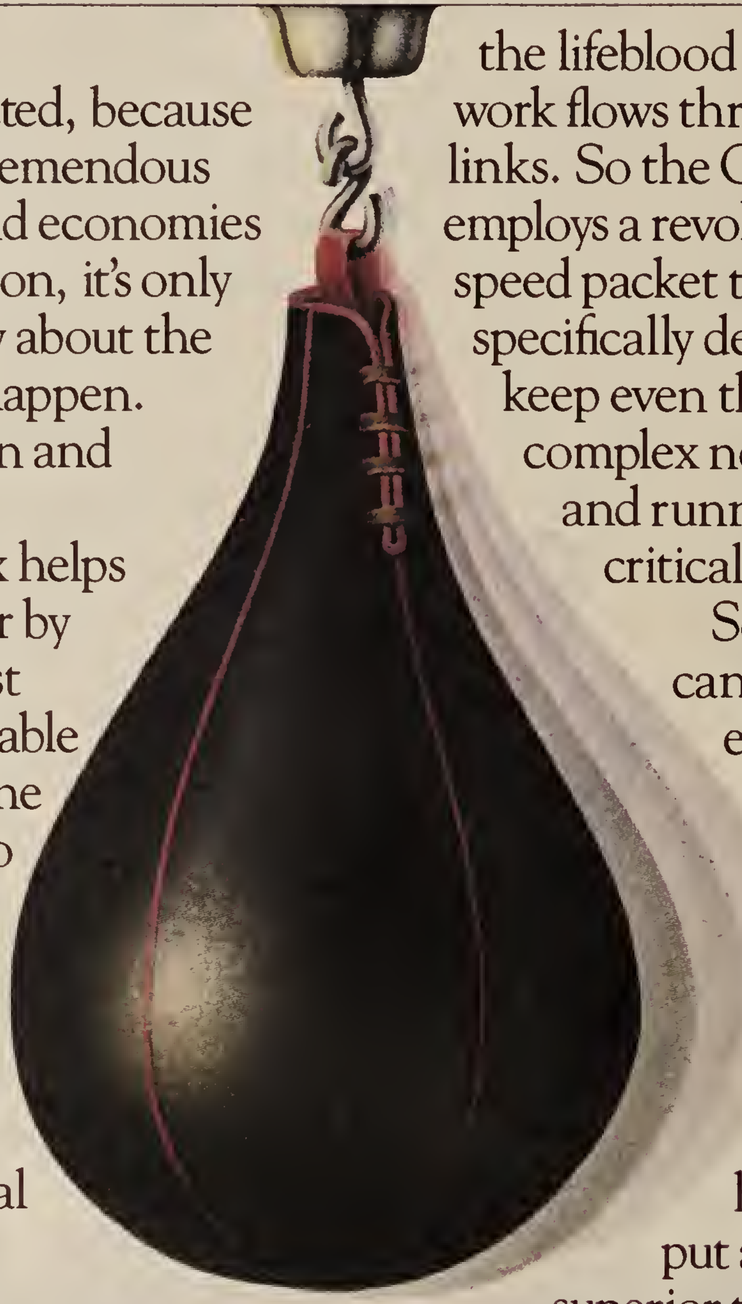


Codex offers T1 users something totally new and unexpected.



Peace of mind.

It's unexpected, because even with the tremendous performance and economies of T1 transmission, it's only natural to worry about the worst that can happen. Downtime, plain and simple.

Now Codex helps alleviate this fear by offering the most resilient and reliable T1 product on the market today. So the worst that can happen, can't.

Introducing the Codex 6290 Integrated Digital Exchange.

By utilizing a totally new T1 technology, Codex can now offer you both incredible reliability and incredible savings (often exceeding 30% in T1 line costs).

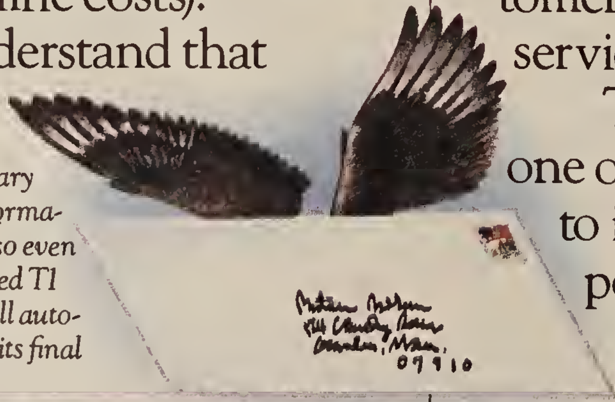
We understand that the lifeblood of your network flows through your T1 links. So the Codex 6290 employs a revolutionary high speed packet technology, specifically designed to keep even the most complex network up and running under critical conditions.

So now you can get the benefits of *both* traditional packet switching *and* circuit switching techniques. Including high throughput and superior toll quality voice transmission.

And of course the Codex 6290 is backed by our worldwide customer support and service organization.

The Codex 6290 is just one of many steps we're taking to improve digital network performance. But what else would you expect from the company with over 25 years' experience solving complex networking problems?

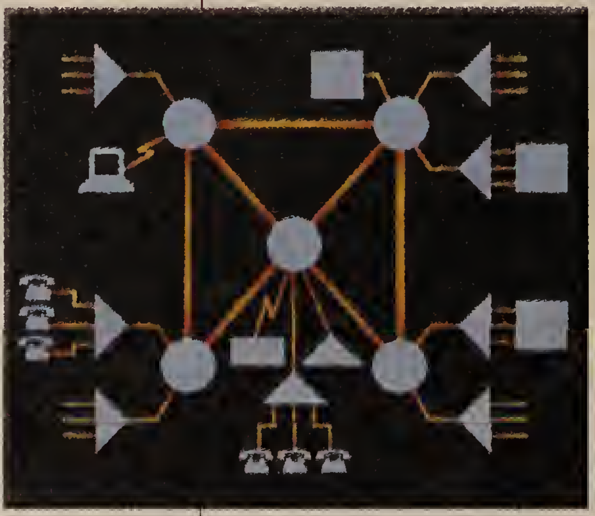
Network Resiliency – *With an economical comprehensive redundancy scheme, self-diagnostic and self-healing capabilities, the Codex 6290 allows your system to immediately and automatically bounce back if it gets hit.*



Fast Packet Technology – *With this revolutionary new technology, information is "addressed," so even if it encounters a failed T1 circuit a "packet" will automatically reroute to its final destination.*

Voice Compression = More Cost Savings – *The Codex 6290 provides 4 to 1 voice compression, so you get twice as much channel capacity without sacrificing voice quality. That translates into savings often exceeding 30% in T1 line costs.*

For more information, call **1-800-426-1212, Ext. 7202.** In Europe, call 32-2-6608980. Or write Codex Corporation, Dept. 707-202, Maresfield Farm, 7 Blue Hill River Road, Canton, MA 02021-1097. And let us prove just how great your expectations can be.



Networking Expertise – *No matter how complex your T1 network, the Codex 6290 can help it run more cost efficiently and reliably. And Codex will help you with complete design, installation, applications and training support.*

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The Networking Experts

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NETWORKING

DATA STREAM

Tom Nolles

The case of the ISDN gap

Those of us who grew up in the 1960s are used to credibility gaps. You would think this would prepare us for ISDN and the ISDN credibility gap we seem to have. Vendors are excited; users are bored.

We've watched ISDN standards evolve, viewed ISDN demonstrations and evaluated the results of ISDN trials — but all without really learning much about what ISDN will do or how much it will cost. Is there a cover-up?

For a good old '60s problem, we need a good old '60s solution: We'll have an investigation and set the blame.

ISDN on trial

The user community has looked to the service trials as guideposts for ISDN application directions. After all, they must be trying something. But as the trials have progressed, we seem no nearer to defining ISDN applications.

But the carriers see another purpose for the trials, one that they feel has succeeded. "We regard the McDonald's trial as a technological, rather than marketing, breakthrough," says Wayne Piper, manager of product development for ISDN at Ameritech.

Continued on page 54

Twisted thinking pays off

American Cyanamid steers data traffic over voice-oriented channels

BY ELISABETH HORWITT
CW STAFF

WAYNE, N.J. — While redesigning its corporate network with an eye to greater efficiency and cost savings, American Cyanamid, Inc. ignored conventional wisdom, which holds that private branch exchange (PBX) systems, ordinary telephone lines and software-defined networks are designed primarily for voice traffic.

PBXs and regular twisted-pair wiring are widely used to distribute both voice and data within company sites. Between sites, voice and data travel together over a hybrid network of T1 backbone facilities, AT&T's Software Defined Network (SDN) and Megacom services and dial-up lines.

The Fortune 100 company's reward? Cost savings in the millions. American Cyanamid estimates that it will save more than $8 million over five years, primarily through consolidating individual voice and data channels into T1 lines and using twisted-pair wiring and fiber optics to economize on workstation moves and changes.

In 1983, John LaTrecchia, director of computer and communications services at the biotechnology and chemical company, embarked on a period of self-examination to find out how the firm could upgrade its voice and data communications facilities to provide better service at lower costs, both now and in the future.

After collecting six months' worth of telecommunications billing statistics for all American Cyanamid locations, the Computer and Communications Services Division decided on the initial step of consolidating individual voice and data lines into T1 links where practical.

For example, some 95 dedi-

Continued on page 50

BRIGHT LIGHTS

Fiber optics ready to shine

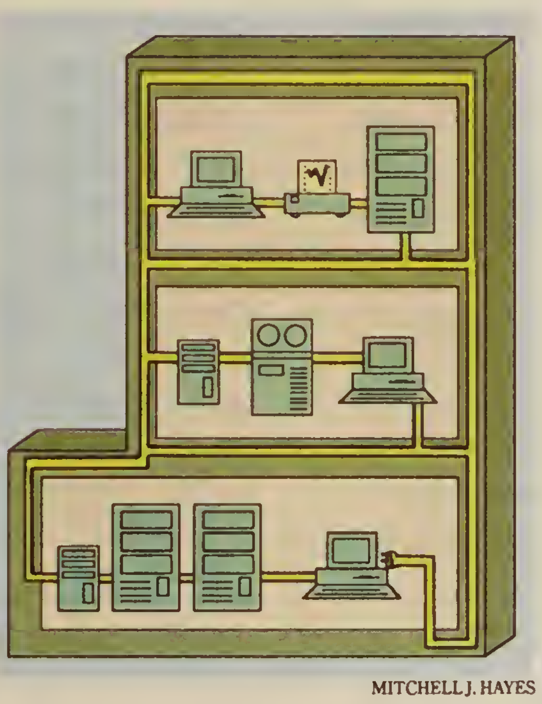
BY JAMES BRYCE
SPECIAL TO CW

Fiber optics. Is it an exotic communications medium? Is it expensive? Does it require great skill to install and maintain? In the past, most telecommunications or MIS managers would have responded with a resounding "Yes" to each of these questions. But recent developments are reversing their opinions.

A major factor in fiber optics' growing acceptance is the standardization of its size, network access techniques and connector types, which has encouraged more vendors to enter the market and which promises to lower prices substantially.

And most important, the Fiber Distributed Data Interface (FDDI) is nearing comple-

Continued on page 51



MITCHELL J. HAYES

Group seeks to soothe user EDI fears

BY STEPHEN JONES
CW STAFF

SAN FRANCISCO — Leaders of the group responsible for developing an electronic data interchange (EDI) standard for U.S. businesses tried last week to calm users' fears that migrating to an international standard might make current interchange systems obsolete.

The Accredited Standards Committee X.12, a subgroup of the American National Standards Institute, put the finishing touches on a list of recommendations calling for a careful migration to the International Standards Organization's EDI guidelines.

The X.12 committee discussed its plans at a week-long conference here attended by about 400 customers, consultants and EDI vendors.

Although a list of the committee's recommendations called for possible changes in the syntax and enveloping requirements of the current data interchange format, officials promised only minor changes to current U.S. EDI implementations.

The plan also called for

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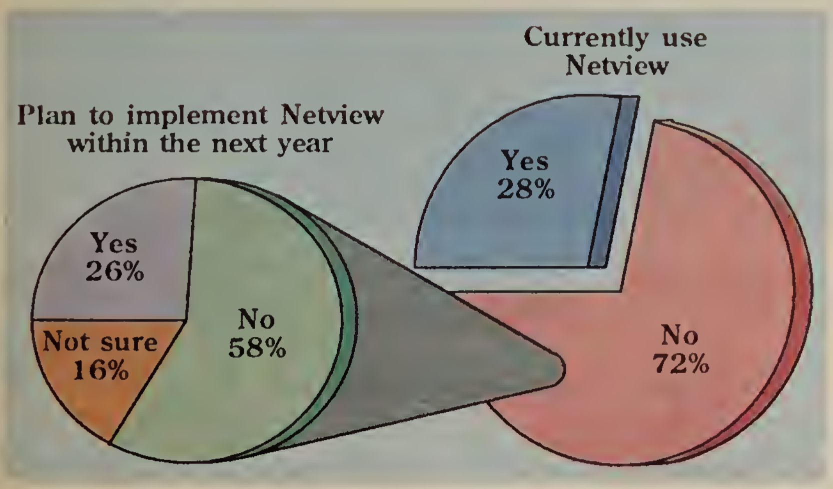
Inside

- Telenet, Bellsouth to test X.25 net merge. Page 53.
- MCI offers dial-up Vnet access. Page 54.
- Racal-Milgo adds reconfiguration, restoration tool. Page 55.

Data View

Users rate IBM's Netview

Based on a survey of 107 IBM Systems Network Architecture customer sites



INFORMATION PROVIDED BY INTERNATIONAL DATA CORP.
CW CHART

Tool marries Apollo Domain to Mac

BY ELISABETH HORWITT
CW STAFF

CHELMSFORD, Mass. — Targeting the low-end graphics workstation market, Apollo Computer, Inc. has agreed to market a new software package from Information Presentation Technologies, Inc. (IPT) that is said to make Apollo's Domain network resources available to users of Apple Computer, Inc.'s Macintosh.

IPT's Ushare gives Apollo an entry into "low-end market segments where users want $2,500 to $3,000 workstation solutions, while we solve the problem for $5,000 and up," Apollo product manager Amy Enfield said. "Our customers have been asking for links to Macintoshes as they become more and more accepted as corporate PCs," she added. Apollo already offers a product to link IBM Personal Computers into the Domain network.

Ushare uses a nondedicated Domain workstation as a gateway between Mac users on the Appletalk network and nodes, peripherals and files on a Domain network, according to Jon Simonds, president of the Santa Barbara, Calif., software firm. The software to bring up Domain resources on the Macintosh is "almost indistinguishable from the Appletalk interface, except that the user has access to a multinode [Domain] server" in addition to other Macintoshes on the network, Simonds claimed.

A VT100 emulation feature is said to allow Macintoshes to access Apollo workstation applications as terminals. Domain workstations can be linked over Apollo's proprietary token-ring network or over Ethernet.

Macintosh users can access files directly on the Domain network through a Unix directory implemented on the Domain gateway. A graphics-based Ap-

Continued on page 50

For years we've been
network management p
a revolutionary networ

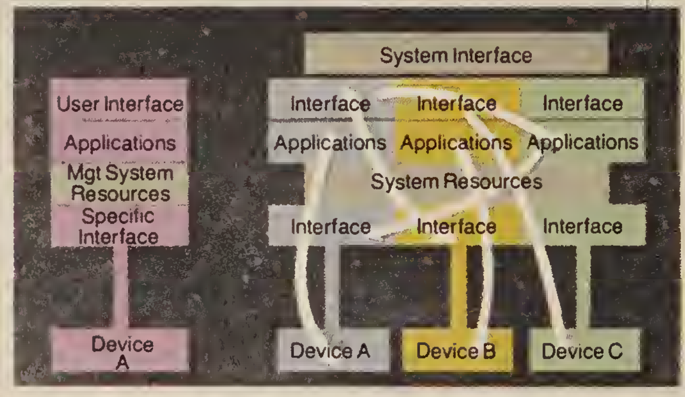
Back in 1978, Codex introduced the first independent network control system. And since then we've been busy introducing one network management innovation after another.

Now it's time for another revolutionary innovation. But this time, it's not simply a new network management product we're developing. It's an entirely new network management concept.

A concept unlike anything you've ever seen before. And a concept you've needed for quite some time.

Why a New Concept?

In today's multi-technology environments, even the best of today's traditional schemes can't keep pace with user demands for comprehensive network reliability, serviceability, and growth. That's because no single system has ever been able to address universal network management requirements.



When your network is simple, so is managing it. But when it grows with multiple technologies, most network management systems simply run out of steam.

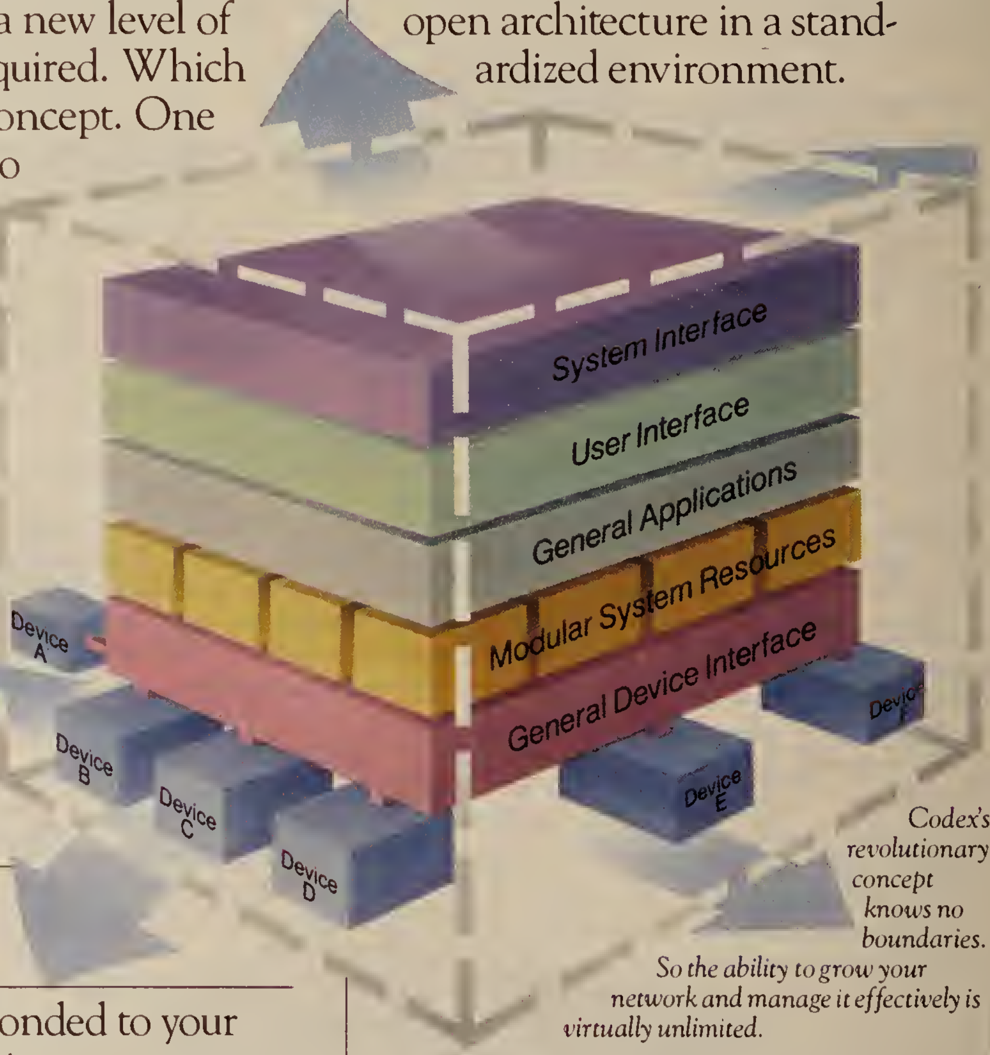
To get maximum network performance in these complex environments, a new level of integration is required. Which requires a new concept. One that allows you to address current network management needs, yet ensures you of optimum control over your network, no matter how complex it may be, or may become in the future.

Codex to the Rescue.

We've responded to your needs by employing a new concept to optimize your overall network's performance.

The result is a revolutionary system that's modular, incredibly easy to use, and offers an extraordinary user interface that provides an integrated systems view of your entire network.

To accomplish this, we've moved from today's proprietary era to our new direction for the entire network management industry. By creating a system based on user demands for open architecture in a standardized environment.



Codex's revolutionary concept knows no boundaries. So the ability to grow your network and manage it effectively is virtually unlimited.

A System Architected for Growth.

Our new system is designed to incorporate the future, accommodating new networking applications as they are developed. That's because it's based on open architecture technology, consistent with emerging OSI standards. Which provides unmatched user flexibility, and unmatched potential for growth.

Within our new network

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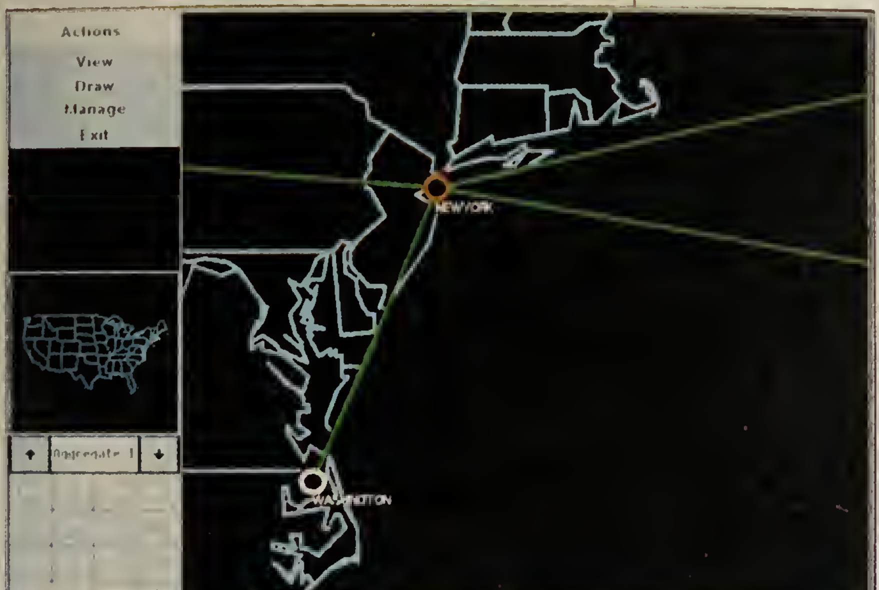
introducing innovative roducts. Now it's time for k management concept.

management concept, all network devices are treated consistently. In fact, it defines a relationship between all network devices and the management system – a relationship never before established. So one system will handle all architected devices, as well as give you the structure to manage unarchitected devices.

Standards Are the Roadmap.

As protocols and applications proliferate, the demand for standardization is greater than ever before. Everyone is talking about standards – they're critical to the future because they facilitate integration, choice and flexibility.

As the leading proponent of vendor-independent networking, Codex has always been an active contributor to the evolution of network management standards. So naturally, we designed our integrated network management system to be fully consistent with emerging OSI standards.



Our new network management concept allows you to control your network no matter how far it reaches.

CURRENT PORTFOLIO
Complete range of network management and control systems
Extensive line of modems (up to 19,200 bps)
Complete selection of multiplexers, switches, and digital transmission devices
X.25 products, SNA gateways, experimental ISDN gateway
Network design and applications engineering support
National and multinational account management
Field service and customer education/training
Lease arrangements

No matter what your networking needs, Codex has the solutions.

True Integration Is Here.

With our new concept, you'll be able to get one consistent view of the entire network topology. With a single management system you'll have the potential to manage and control your entire network – statistical and time division multiplexers, T1 muxes, modems, X.25 concentrators – and other network devices. And that includes access to your computing equipment.

And we've engineered a non-proprietary technology that can work with other systems – in conjunction with IBM's NetView, for example – to give users truly integrated control of their network.

This level of control allows you to *take decisive corrective action* to optimize network performance. Because the information and the management commands for your entire network are integrated and provide a unified database, one system provides full problem, fault, event and performance management – with extensive diagnostic, restoral, reconfiguration and reporting capabilities to maximize overall network availability.

Call For More Information.

Obviously, there's lots more to tell than this space allows. To obtain a free brochure outlining our revolutionary approach to network management, call **1-800-426-1212, Ext. 246.** In Europe, call 32-2-6608980. Or write to Codex Corporation Dept. 707-46, Maresfield Farm, 7 Blue Hill River Road, Canton, MA 02021-1097. We promise it will change the way you look at network management forever.

codex

MOTOROLA

The Networking Experts

Twisted thinking

CONTINUED FROM PAGE 47

cated voice lines and 25 data circuits ran between three corporate sites in New Jersey at a cost of $280,000 per year. By replacing those lines with T1 links and reconfiguring the voice routing, American Cyanamid cut the cost to $86,000 per year while doubling the available channels for voice and data transmission, according to Joseph Kascik, manager of network planning.

Preparation for the conversion began in 1981, when Cyanamid began upgrading its equipment installation "to make our network smart and to position ourselves for a virtual network environment, which seemed the inevitable network direction of AT&T," Kascik said. Cyanamid's switching equipment then consisted primarily of AT&T Dimension PBXs, with some Northern Telecom, Inc. SL1 digital PBXs. Systems that had been installed since 1982 had drop-and-insert capability as well as the ability to function as full network nodes. "Those smart backbone digital systems positioned the company to better support various new data and voice applications, which were rapidly evolving," Kascik noted.

After some evaluation, the company decided to become the first commercial installation of AT&T's System 85 Version 3 in October 1985. The digital PBXs were chosen for their ability to perform as intelligent switching nodes on Cyanamid's corporate network, in which PBXs at each site exchanged transmissions, over either AT&T's SDN service or private tie lines, via AT&T's Electronic Tandem Network (ETN).

One big advantage of the System 85, Kascik said, was its ability to support direct termination of T1 lines from a local central office, Direct Inward Dial and Foreign Exchange services. This allowed Cyanamid to consolidate its voice services over T1 links to New Jersey Bell's central office, significantly improving performance, according to Kascik.

Cyanamid also became a beta-test site for AT&T's Digital Multiplex Interface link between the System 85 and Hewlett-Packard Co. computers, which support virtual terminal-to-host connections. Terminals were connected to the PBX over regular twisted-pair wiring instead of special coaxial cable, saving thousands of dollars in installation costs for new workstations. "At the Wayne site, at least 60% of people moved once a year, and the costs of running new cable were killing us," Kascik said.

Approximately 600 IBM 3270 terminals, 150 Wang Laboratories, Inc. terminals and 600 IBM Personal Computers access corporate hosts via twisted-pair links to PBXs, and from there over a fiber-optic link within the building, with T1 lines used for remote host connections between sites, Kascik said. This arrangement gives more than adequate response time for low- to medium-volume users, he claimed. High-volume users, such as programmers who do order entry all day on IBM hosts, use direct connections "because we don't want to clog up the PBXs," Kascik said.

Cyanamid's third major step was to switch a number of its sites from private, ETN connections to AT&T's SDN, a virtual network that offers ETN-like functionality over the toll network, Kascik said. So far, the company has replaced 175 of its tie lines with virtual connections. While AT&T markets SDN primarily as a voice service (the carrier is said to be preparing a software-defined data network offering), Cyanamid has found that SDN connections are more than adequate for transmitting data at up to 9.6K bit/sec.

Kascik, who oversees network planning for both voice and data communications, has never looked back from the initial decision to entrust both voice and data traffic to voice-oriented networking facilities. "Why should I set up separate networks for voice and data when I am already paying for a facility supporting both?" he asked.

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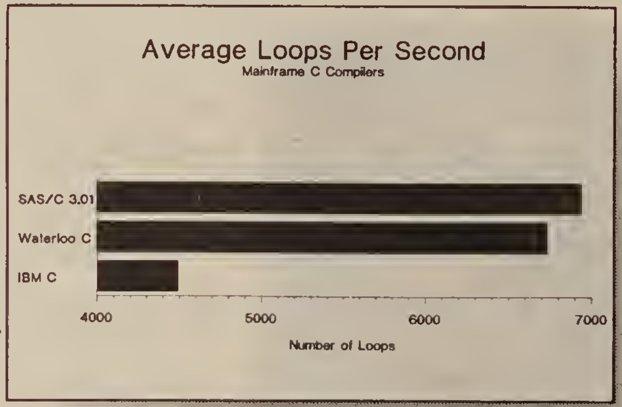

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Apollo Domain

CONTINUED FROM PAGE 47

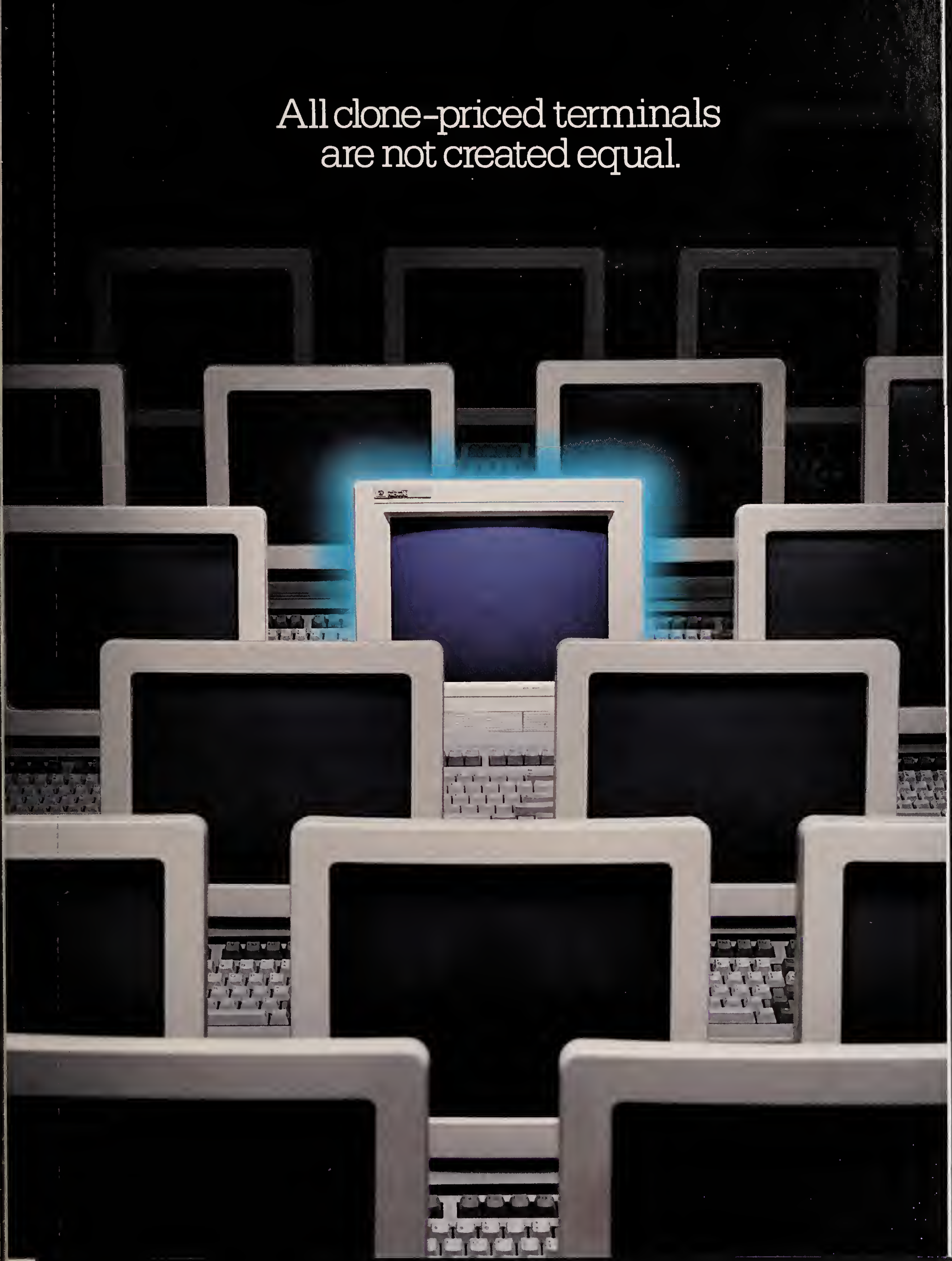
pletalk-like interface is said to insulate users from the technicalities of the Unix directory structure.

The software features a Unix electronic mail package that allows Macintosh users to exchange documents with IBM PCs, Apollo workstations and other Macintoshes across networks based on Domain, Transmission Control Protocol/Internet Protocol, Ethernet and Appletalk protocols, Simonds said.

Future Ushare features will include bidirectional file sharing and a Macintosh implementation of Network Computing System, Apollo's distributed computing environment, according to Enfield.

The companies plan to introduce in the first quarter of next year a gateway box that will allow three to four Appletrunks to be linked directly either to Ethernet or Domain. An Ethernet card for the Macintosh should be released during the same time frame. The future releases will allow Macintoshes to participate as peers on an Apollo network, Enfield noted.

Ushare is scheduled to be available by mid-December. The server software, which can support an unlimited number of Macintosh users, is priced at $1,195. The server E-mail facility and disk server package are priced at $395 apiece. E-mail, terminal emulation and server access software packages for the Macintosh are each priced at $39.95 per Macintosh.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iber optics

OM PAGE 47

n by the American National ndards Institute. While many rent installations of fiber op- s have opted for Ethernet — its close cousin in standards, E 802.3 — as their commu- ations protocol, many tele- nmunications managers rec- nize the need to plan for a ure that is likely to include the 0M bit/sec. fiber-optic stan- d.

Howie McCausland, network d operations manager for the culty of Arts and Sciences at rvard University in Cam- dge, Mass., oversees the uni- rsity's current fiber-based hernet local-area network. He s he is, however, open to the ssibility of replacing "the ex- ing Ethernet arrangement th other technologies — for ample, FDDI."

And vendors are jumping on e FDDI bandwagon, too.

Al Bender, president of Fiber- m, Inc., a Roanoke, Va., data mmunications products manu- turer, says a major selling int for Fibercom's fiber-based hernet LAN is "100% re- cement credit for FDDI." e Whispernet LAN incorpo- tes a fiber-core size of 62.5 mi- ons, which is the FDDI re- irement.

a word — plastics

nother reason for the increased erest in the medium is the ailability of plastic fiber.

Besides being more flexible d more immune to mechanical mage, plastic costs considera- y less to install than glass fiber metallic cable.

In addition, Hoechst AG in ankfurt, West Germany, orking in conjunction with Co- noll Technology Corp., a Yon- rs, N.Y.-based fiber-optic mponent manufacturer, has veloped a plastic fiber with a ndwidth of 1.5 GHz over ter- inal-to-wiring closet distances.

Michael Coden, Codenoll's esident, points out that with e higher bandwidth, "plastic nds the fight over using fiber to e workstation."

he high-cost fallacy

ut what about the price battle? lany prospective fiber users are ncerned about the high cost of ber optics. Most consultants, owever, say that cost should ot be the primary factor in a urchasing decision — future eeds and potential recabling oes are important consider- tions, too.

"If there is a chance you need higher bandwidth," says Sey- nour Merrin, president of Mer- in Resources, a data communi- ations consulting firm in outhport, Conn., "it is better to et it now," rather than install nsufficient bandwidth today and ay for hardware and cabling upgrades tomorrow.

"As soon as you pull that second wire, it would have been easier to have put in fiber," he adds.

Chuck Kaufman, director of network services at Manchester Equipment Co., a computer systems supplier in Hauppauge, N.Y., explains his company's fiber philosophy this way: "The more critical the application, the more we'll recommend fiber. Our experience shows that 90% of the problem in data communications is with the cables."

Manchester Equipment has supplied fiber networks to Chrysler Corp., *The New York Times*, Avon Products, Inc. and Goldman, Sachs & Co. In some instances, the fiber systems replaced recently installed but less reliable metallic cables.

> "IF YOU'RE putting in a network that has the probability of growing in power and size, use fiber."
>
> SEYMOUR MERRIN
> MERRIN RESOURCES

Kaufman observes, however, that fiber installations usually cost 1½ to two times more than comparable metallic systems.

But Coden maintains that fiber-optic cabling doesn't have to be expensive. "IBM's Type 1 cable costs $1.10 per foot more than Codenoll's glass fiber," he says.

And Harvard's McCausland points out that the university's fiber-optic backbone system was actually less expensive than a broadband system that the school also considered. "There is more future in fiber than in broadband," McCausland contends.

What fiber does better

Reliability, growth options and versatility are what fiber optics is all about. Optical signals are immune to interference from static charges, grounding differences and cross talk. A fiber carries no electricity, so it may be used in an explosive atmosphere such as a chemical plant or refinery.

In addition, fiber can carry hundreds of megabits of information for tens of miles without repeaters. Fiber can carry data, voice, process control and video. And it can be installed and maintained with a minimum of training and supervision.

Most users are primarily concerned with backbone use of fiber. The notable exception is within financial organizations, where total reliability is important. There, fiber-optic connection of each workstation is increasingly becoming the rule.

Much of the current interest in fiber among data processing and telecommunications managers stems from the use of existing twisted-pair telephone wiring for computer communications. Communications firms are pushing the limits of technology with schemes to provide ever-greater data rates over ever-poorer grades of twisted-pair.

But a strategy based on these technologies is doomed to failure, Merrin contends. "Higher data rates without degradation are possible to get on fiber," he says. Today, 10M bit/sec. for a few hundred feet over telephone-grade twisted-pair looks good, but tomorrow, users will want parallel processing, bit-mapped exchanges and memory exchanges, at which point 10M bit/sec. will be far too slow, he points out.

"If you're putting in a network that has the probability of growing in power and size, put in fiber," Merrin suggests.

What can I buy?

Several fiber-optic products are available today to users willing to take the plunge.

Whispernet, the FDDI-based LAN from Fibercom, costs $895 for a single-node device. Multiport equipment with eight ports costs $1,800, or $225 per port. The Whispernet configuration reportedly amplifies at each node, thus avoiding the need for repeaters.

Codenoll is said to provide network connection to fiber-optic cable using several protocols: Ethernet, Arcnet, Manufacturing Automation Protocol (MAP) and IBM's Netbios running PC Network over Ethernet. This equipment is connected to an optical star coupler using a star topology of fiber. These optical star couplers can be either passive, using only the light supplied by the computing devices, or active, providing amplification of the light.

Codenoll has provided fiber-optic equipment to a number of companies, including Southwestern Bell Corp., Pacific Bell and GTE Communication Systems, Inc.

Codenoll's personal computer adapter cards range in price from $695 for an Arcnet card to $995 for an Ethernet card.

Another fiber-optic product is available from Siecor Corp. Jay Cunningham, technical support manager for fiber optics at Siecor's Electro-Optical Products division in Research Triangle Park, N.C., says the Siecor Universal Concentrator "allows you to prewire a building and run cable out to devices without regard to whether Ethernet, token-ring or FDDI is the protocol. We recommend a 62.5-micron core."

Siecor provides both active and passive star couplers and has a collision-detection product that reportedly improves network performance under the Ethernet protocol. Siecor's Ethernet active star coupler starts at $1,100 per node.

Quinn Dennis, systems engineer at Koch Refining Co. in Corpus Christi, Texas, is a user of Siecor equipment. He says the installation "went very well. The electricians liked using the fiber because it was easy to pull."

The Koch system is actually viewed as four or five networks: Digital Equipment Corp.'s VAX Ethernet, a MAP network, RS-232 links for data from processes, a tank-gauging network and a video network. Each network runs on a separate pair of fibers. The fiber measures 62.5 microns wide.

Hyannis, Mass.-based Fibronics International, Inc. offers an FDDI-based fiber-optic LAN. According to the vendor, its System Finex is the first network to conform to the standard.

System Finex costs $36,000, which includes all hardware and software: a dual attachment station, network management software and up to four device interface units.

Artel Communications Corp. offers Fiberway, a fiber-optic digital broadband LAN that supports Ethernet, RS-232, IBM Token-Ring and other networks, according to the Worcester, Mass.-based company.

Fiberway is available for $8,750 per node with an Ethernet connection.

Why the market will explode

What does the future hold for the fiber-optic market?

John Kessler, president of KMI Corp., a communications market research firm in Newport, R.I., forecasts tremendous strides in sales of fiber-optic cable and components over the next five years.

"The fiber-optic data communications market will go from $171 million in 1987 to $813 million in 1992. Overall fiber-optic sales are now $700 million and will be $2.9 billion in 1992," Kessler says.

"Just those products that concern premises, including local-area networks, will increase from $19 million in 1987 to $314 million in 1992," he adds.

Kessler attributes these increases to four specific buying decision factors:

- "The major reason is the significant increase in data rate possible with fiber and a slight increase in distance over copper. This makes fiber more economical," he says.
- Second, he adds, while the cost of fiber-optic cable and its components is decreasing, copper wiring and associated cable prices are stable or are slightly increasing.
- Third, Kessler says, there is increasing use of fiber-optic cable in installations where copper cabling creates several undesirable points of failure, such as in trading rooms in stock exchanges.
- Finally, fiber-optic cable carries no electricity, so it can avoid electromagnetic interference from motors and lights in buildings, he points out.

> "IF YOU stay with fiber, the cable is light, easy to place, resistant to interference and adaptable to LANs in the building."
>
> JOHN KESSLER
> KMI CORP.

"Perhaps a fifth reason," Kessler notes, "is the possibility of directly connecting with the fiber coming from the telephone central office; if you stay with fiber, the cable is light, easy to place, resistant to interference and adaptable to LANs in the building."

JAMES BRYCE

AT&T revamps System 75, Dimension options, prices

BY ELISABETH HORWITT
CW STAFF

BASKING RIDGE, N.J. — AT&T has brought out enhancements to the System 75 digital private branch exchange system as well as new pricing and upgrade options for the Dimension analog PBX family.

The System 75 has gained two new capabilities. First, users on different System 75s can now share a single Audix voice-mail system over an AT&T Distributed Communications System private network. Second, attendants at one centralized user site can handle calls both for the local PBX and for branch systems at two or more locations.

While pricing varies according to System 75 configurations, the enhancements can be added for as little as $500, AT&T said. The software is scheduled for commercial shipment during the second quarter of 1988.

AT&T has also expanded the pricing and upgrade options of its Dimension PBX customers with the release of Dimension Flex Plan. Under Flex Plan, Dimension customers can receive credits of up to 30% toward the purchase of a System 75 or System 85 digital PBX, AT&T said.

Through an expanded Flex Term options package, special low rates are offered to customers willing to sign 12- or 24-month term plan agreements. Under AT&T's older rate structure, special terms were available only to customers who signed up for a 36-month term plan.

Another Flex Term option allows customers to upgrade to a System 75 or System 85 — without termination charges — at any time during the second half of a 12-, 24- or 36-month Flex Term period. Flex Plan incorporates recently announced discounts on the Audix voice mail systems, as well as a reduced rate for the 36-month Dimension term plan agreements.

Users sketch MAP/TOP link guidelines

SANTA BARBARA, Calif. — A MAP/TOP Users Group subcommittee recently completed a preliminary specification detailing a standard interface between IBM's Netbios and the Technical and Office Protocol (TOP) suite of communications protocols.

The proposed standard implements the Netbios interface on top of the ISO's Transport Class 4 protocols.

All comments on the standard will be considered at the next meeting of the TOP-Netbios Technical Subcommittee, slated for Dec. 10-11 in Tempe, Ariz. The specification will then be submitted to the MAP/TOP Users Group.

The subcommittee's objective is to define a standard for implementing Netbios on computer systems that communicate using TOP 3.0-based networks. The proposed standard, if approved, would become part of the final version of TOP 3.0.

The subcommittee predicted that products conforming to that specification might be available at the MAP/TOP Enterprise Networking Event 1988 International conference, which will be held June 5-9 in Baltimore.

MICROSOFT'S OS/2 LAN Manager, which is scheduled for delivery in the first half of 1988, is expected to be one of the first products to use the TOP-Netbios standard.

Netbios is a de facto standard for communications between personal computer-based applications running on local-area networks.

Netbios has picked up steam this year. Despite concern that IBM would discontinue its support and force users to migrate to the Advanced Program-to-Program Communications protocols, the company recently announced a network server product that includes support for Netbios.

In addition, in March, a group of vendors that manufacture Transmission Control Protocol/Internet Protocol (TCP/IP)-based networks hammered out a specification for Netbios support under TCP/IP.

"The TOP-Netbios standard is being anxiously awaited by major players in the industry," said Stephen Thomas, a senior software engineer at Communication Machinery Corp. and vice-chairman of the committee, in a prepared statement.

He claimed Microsoft Corp.'s OS/2 LAN Manager, which is scheduled for delivery in the first half of 1988, is expected to be one of the first products to use the TOP-Netbios standard.

Thomas also said he expects government users migrating from PC LANs using TCP/IP protocols to those based on the Government Open Systems Interconnect Profile standard will be interested in the TOP-Netbios standardization effort.

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Telenet, Bellsouth plan to tie networking knot

CCITT X.25, Pulse Link X.25 connections to be test-marketed in two southern regions

BY JEAN S. BOZMAN
CW STAFF

CHICAGO — Telenet Communications Corp. and Bellsouth Advanced Networks Co. last week announced an agreement to tie Telenet's CCITT X.25 public data network to Bellsouth's Pulse Link X.25 networks in two pilot areas: Atlanta and Gainesville, Fla.

The connections will allow Bellsouth's local packet-switching customers to access Telenet's international packet-switched network, according to both of the companies.

The two initial sites should become the first of many serving customers throughout parent Bellsouth Corp.'s nine-state region.

First step

The connection to Bellsouth's local packet-switching network is the first of several planned by Telenet, which hopes to establish such connections with the regional holding company lattice nationwide, said Floyd Trogdon, vice-president and general manager of Telenet.

The announcement, which came at the 19th annual conference of the Information Industry Association held recently in Chicago, highlighted predictions made by conference speakers that strategic alliances between companies that possess complementary telecommunications products should become commonplace by the 1990s.

"This industry must face up to the fact that one company can't do it all," maintained Sidney Boren, who is vice-president of corporate planning and budget for Bellsouth.

The Bellsouth-Telenet connection will target users who want more cost-effective connections to information services, a Bellsouth spokesman said.

This move is an integral part of Bellsouth's strategy for becoming a full provider of information service networking, an effort that has been frustrated by the recent decree by U.S. District Judge Harold H. Greene.

The carrier recently submitted a proposal to Greene recommending that divested Bell operating companies be allowed to provide information storage, protocol conversion and transport, the spokesman indicated.

"We want to do everything except actually generate the information," the spokesman said.

EDI users

FROM PAGE 47

possible increases in membership dues as international activities increase as well as the chance for a change in X12's position to accommodate international requirements in the areas of messages, maintenance practices and data elements.

"We have a large, consistent embedded EDI base in the U.S. that we have to protect while working toward the goal of leading an international standard," said Anthony D'Anna, an AT&T executive who serves as chairman of the X12 committee. "We have to avoid a disruptive transition."

Simple software swap?

While committee members stressed such guarantees, it was not clear last week whether a move to the 9735 international standard would require a company to do more than make a simple software swap with its EDI system.

The chance that a new standard would force a company to start from scratch might curtail an otherwise burgeoning EDI industry.

"The U.S. is such a major trading partner abroad that an international standard is a good idea, but new EDI users might wait to adopt a standard if there's a chance later on that they'll have to change over to something else," said Victor Wheatman, editor of "The EDI Reporter," a newsletter published by market research firm Input.

Copies in the mail

The X12 committee finalized the recommendations last week and is expected to mail copies of the migration strategy to its 196 corporate members for consideration.

D'Anna, emphasizing that this is only the first of several steps needed to reach a new standard, said the committee will vote to accept or reject the guidelines at its February meeting.

Conference attendees also voted to form a North American EDI users group that will help North American companies build partnerships with companies in foreign countries, enabling them to do business through messages developed as potential EDI standards.

The newly formed North American International EDI Users Group will meet quarterly at every X12 committee gathering.

Hans Weiting, president of Sealand Corp., was elected chairman of the users group.

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Nolle

FROM PAGE 47

Trials conducted during the last year have proved that ISDN services can be provided at the carrier level, and customer-premise equipment (CPE) vendors have responded with ample product offerings to support those services. "We're very happy with the trial results," Piper asserts.

Another aspect of current ISDN trials that may excite carriers more than users is the emphasis on Centrex. Many of the trials going on today are pretty much ISDN versions of Centrex — and that may be responsible for users' negative outlook on the standard's future. Centrex is a popular service with the Bell operating companies because it generates revenue, but it's hardly the most common telecommunications environment.

The trials we've had so far have another limitation: they only involve the ISDN Basic Rate, which defines two 64K bit/sec. B channels that typically run between the user's workstation and the nearest switch.

The primary connection

The carriers are now in the process of examining another route to the user's desktop: the Primary Rate, which sets up 23 B channels and is the ISDN equivalent of a T1 link. AT&T has promised a Primary Rate service by year's end. By using a private branch exchange (PBX) with primary rate, a business can enjoy ISDN connectivity using the digital telephone sets and data adapters already supported by the PBX, eliminating the cost of terminal adapters and ISDN terminals for Basic Rate. Companies can also save access charges by bunching all their user channels into one Primary Rate link to the carrier's office.

Despite what seems a user advantage, Primary Rate appears to ring no bells for some major carriers and CPE vendors. "We understand Primary Rate, and we will offer it. We do not see that as the vehicle of choice for delivering ISDN" by an operating company, Piper says. "We will offer Primary Rate when it is provided to us by AT&T" is the response of Bill Evans, area manager of industry liaison for Southwestern Bell. Even IBM seems cautious. "ISDN Primary Rate has little economic advantage over T1. It's primarily a call-by-call service selection facility," says Robert Bertram, IBM/Rolm's director of marketing for switched products. From these comments, we can infer a lack of vendor support for critical ISDN interfaces, right?

Perhaps, but if Primary Rate isn't going anywhere, why have AT&T and Northern Telecom both announced PBX support for it? Why is Rolm promising Primary Rate trials in Europe and the U.S.? Timeplex, NET and Infotron — all T1 multiplexer vendors — are committed to Primary Rate product offerings.

"But there are no ISDN applications," you say. Is that so? Southwestern Bell has four customers for ISDN in 1988 who think there are, and these are customers who actively sought out ISDN opportunities. 3M in Austin, Texas, is planning to use ISDN to integrate voice and data in networks and to position itself for wide-area networking improvements. Shell Oil in Houston wants ISDN as the technology to integrate voice and data at the desktop.

Tenneco, also in Houston, sees ISDN as a flexible way to support decentralization and diversification of the business, and AT&T Network Systems in St. Louis says it can save $1 million annually through use of ISDN to eliminate movement and switching of data terminals.

Southwestern Bell's Evans indicates that specific discussions with these clients generated interest, which the clients themselves translated into applications. These customers are "technologically affluent" (that's the "in" way of saying "leading-edge"), but more than 1,000 firms of all types have visited Southwestern Bell's Telephone Advanced Technology Laboratories for ISDN briefings and demonstrations. A third center is being built in St. Louis, and these centers support both technology and application development.

Southwestern Bell may well have found the key to user acceptance of ISDN: education. "Everyone thinks ISDN provides a lot of services once you plug into some kind of universal jack," Evans says. But in reality, he goes on, ISDN just provides better connections for existing and new applications. Not knowing what to do with ISDN is thus like not knowing what to do with 56K or 64K bit/sec. Digital Data Service.

Shall we?

For equipment vendors and carriers, ISDN almost seems the inevitable next step of the evolution toward digital communications — which began before ISDN was ever acronymed. "ISDN is a necessary part of carrier services in the future," Ameritech's Piper says.

Well, communication planners and users, why don't we? It seems that we, and not carriers or vendors, are the stumbling block of ISDN applications. What is ISDN but message-controlled wide-band digital service? Most business users are probably digital today, except for about two miles of their connections. There are even switched wide-band digital services available today, from AT&T and Northern Telecom, and real users for them. Plan for digital service and you plan for ISDN. There are no applications to justify 64K bit/sec., you say? We all remember when 1,200 bit/sec. was fast; have we forgotten how long it took for it to be not fast enough?

Nolle is president of CIMI Corp., a communications consulting company based in Haddonfield, N.J.

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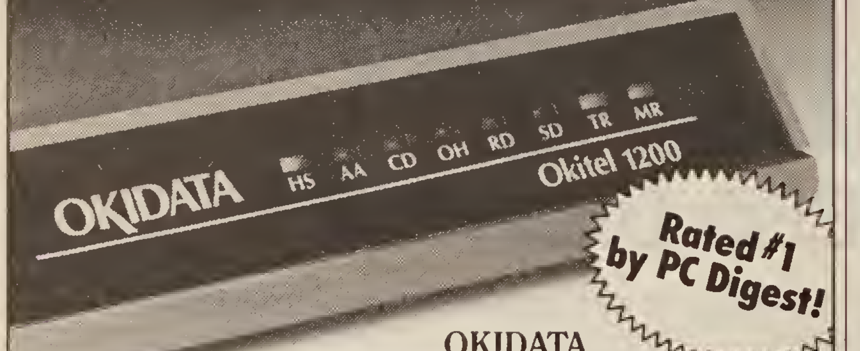

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BIT BLAST

AT&T, MCI offer low-cost options

MCI Communications Corp. has announced that customers can have dial-up access to its Vnet virtual private network. This will provide a low-cost option for companies that cannot cost-justify linking up to the service over private lines. MCI's archrival, **AT&T**, provides such an option for its Software Defined Network.

MCI will also introduce in December a card said to provide access to Vnet from any push-button telephone, using an 800 number.

AT&T recently proposed a tariff that would significantly increase the installation charges and monthly rates paid by some customers for analog private lines. Rate increases would be greatest for short distances, according to AT&T.

For example, mileage charges for a 25-mile circuit would increase from $116.99 to $132.20. One-time charges for installing or changing the circuit at an AT&T central office would climb from $82.70 to $134.65, the carrier said. The revised rates would reportedly increase AT&T's overall revenue by approximately $72.3 million.

To help the federal government make a smooth transition to the Integrated Services Digital Network (ISDN) standard, the **National Bureau of Standards** is establishing an ISDN laboratory. It will be used primarily to demonstrate ISDN technology, using donated equipment and services, and to develop standards and test methods.

3Com Corp. recently unveiled a cooperative selling plan, targeted at corporate accounts, that integrates the company's reseller channel with its Bridge Communications, Inc. division's internal sales force. The new sales program provides incentives for the Bridge sales force to use cooperative selling techniques with resellers, such as making joint sales calls and pitching sales proposals that promote the 3Com/Bridge line.

The Laguna Hills, Calif., firm **Network Software Associates, Inc.'s** line of IBM Systems Network Architecture/Synchronous Data Link Control (SNA/SDLC) communications software will now run on virtually any SDLC communications adapter on the market, including terminal emulation boards from Digital Communications Associates, Inc. and IBM, the vendor claimed. The software is designed for IBM Personal Computers and Personal System/2s.

The enhancement brings Network Software's products closer to the IBM Systems Application Architecture ideal, which specifies that software should be portable across various hardware environments, Network Software said. The vendor's SDLC software includes implementations of IBM's RJE, 3270, LU6.2 and PU2.1 protocols.

Atari Corp., Digital Equipment Corp. and **Hewlett-Packard Co.** have all signed up for an infusion of Fusion, **Network Research Corp.'s** Transmission Control Protocol/Internet Protocol (TCP/IP) software. Fusion provides TCP/IP connectivity for DEC VMS systems, Atari Mega workstations and HP 9000s, the vendors said.

Novell, Inc. and **Micronyx, Inc.** announced a technical and marketing agreement designed to offer secure Netware networks for use in industry and government. Netware is Novell's network operating system. The agreement involves integrating Micronyx's Triad Plus turnkey security subsystem into Netware. Products developed by the vendors will be out next year.

NEW PRODUCTS

Local-area network hardware

The **CC-9000** cluster controller designed to provide Intel Corp. 80386-based personal computers with serial communications has been announced by **Star Gate Technologies, Inc.**

The stand-alone controller features an on-board processor, 512K bytes of random-access memory and system software. It has eight serial and two parallel ports and can be located up to 800 ft from the host PC, connected via unshielded twisted-pair telephone wire. It offers full-duplex operations and data transfer rates from 50 to 38.4K bit/sec.

Based on Starlan hardware, it can be connected to the host by a 10-port Starlan hub, a dual-port minihub integrated onto a Starlan serial card or by a single minihub on a card.

The CC-9000 costs $1,495.

Star Gate Technologies, Suite 109, 33800 Curtis Blvd., Eastlake, Ohio. 44094. 216-951-5922.

Local-area network software

A software product said to allow Digital Equipment Corp. VAX and Microvax computers to communicate on Ungermann-Bass, Inc. Net/One local-area networks has been introduced by **Interconnections, Inc.**

The product, called **I Star**, uses Ethernet interfaces. It provides the functions of Net/One for VAX/VMS systems, including terminal-to-VAX communications and personal computer-to-VAX file sharing via Microsoft Corp.'s MS-Net.

According to the vendor, terminals and PCs connected to token-ring, broadband or fiber-optic networks can access VAXs running I Star via Net/One bridges.

License fees start at $5,000.

Interconnections, 2851 152nd Ave. N.E., Redmond, Wash. 98052. 206-881-5773.

CBIS, Inc. has enhanced its **Network-OS** local-area network operating system for IBM personal computers.

Network-OS features IBM Personal System/2 compatibility, high-speed disk caching, remote boot capabilities, support for diskless workstations with autoreconnect, optional password encryption, asynchronous communications and menu-driven print spool encryption, the vendor said.

Network-OS costs $160 per node and $1,280 for a 30-user site license.

CBIS, 2323 Cheshire Bridge Road, Atlanta, Ga. 30324. 404-634-3079.

Network management

Two windowing facilities have been added to **Release 2.0** of the **LAN Shell** network menu system announced by **Lan Systems, Inc.**

Features include windows display-screen output from any DOS command, selection of files from a windowed directory listing and new installation procedures. Both types of windows can be placed anywhere on the screen in any size.

Also included in Release 2.0 is a utility for computing and displaying the size of directories and attached subdirectories.

Lan Systems also enhanced its LAN Librarian document management utility to include automatic file naming in sequence, user profiles and a new installation procedure.

The LAN Shell costs $695 per server. The LAN Librarian costs $995 for up to 20 users.

Lan Systems, 599 Broadway, New York, N.Y. 705622. 212-431-8484.

Brightwork Software, Inc. has enhanced its **Netmanager** and **Netremote** local-area network management products.

Enhancements include support for Novell, Inc. networks that have multiple network segments. Access is provided to the screen and keyboard of all networked personal computers, even those located across Novell Netware bridges.

Other features include the ability to track open and closed trouble reports, additional data base functions for storing individual PC hardware configuration information, enhanced user data base functions to manage information about network users and additional management reports.

Netmanager costs $1,495 for a single management station, and Netremote costs $695 for up to four file servers.

Brightwork Software, P.O. Box 8728, Red Bank, N.J. 07701. 201-530-0440.

Customer-premise equipment

The **Communications Management Series** (CMS) **Matrix Switch, Model IV**, a network reconfiguration and restoration tool, has been announced by **Racal-Milgo**.

The CMS Model IV is supported by two processors, each with its own 40M-byte hard disk. It can support up to 4,096 ports in a nonblocking, any-port-to-any-port arrangement. According to the vendor, switch configurations can be modified at any time without disrupting network operations.

The basic configuration consists of a central switching unit that controls data handling and routing for up to 16 satellite units. Each satellite unit connects to any combination of network and data processing equipment as well as private, common carrier, analog and digital transmission faciities. RS-232/V.24, analog and V.35 interfaces are supported.

The CMS Matrix Switch Model IV costs about $400 per port.

Racal-Milgo, 1601 N. Harrison Pkwy., Sunrise, Fla. 33323. 305-475-1601.

Links

Across the Boards, a program interface for the IBM Personal Computer, has been announced by **CFsoftware, Inc.**

According to the vendor, Across the Boards provides a means of communication between user applications running on the IBM PC and applications running on the mainframe host.

It interfaces with programs written in Cobol, C, Basic, Pascal, Prolog and assembler and provides access to coaxial boards, local-area network gateways, bisynchronous and IBM Synchronous Data Link Control communications.

A mainframe site license costs $2,000 for the first device, $1,500 for the second and $1,000 for each additional device. Protocol converter support costs $4,000. Developers' and corporate licenses start at $5,000.

CFsoftware, Suite 205, 2434 E. Dempster, Des Plaines, Ill. 60016. 312-824-7180.

Mac-Streamer, a nine-track, ½-in. tape drive with a small computer systems interface controller for the Apple Computer, Inc. Macintosh, has been announced by **Qualstar Corp.**

The product comes with Mac-Streamer tape utility software, which allows users to transport data between the Macintosh and minicomputers or mainframes. The reel-to-reel tape can exchange more than 80M bytes of data per reel, according to the vendor.

Mac-Stramer costs $3,995.

Qualstar, 9621 Irondale Ave., Chatsworth, Calif. 91311. 818-882-5822.

Network Software Associates, Inc. (NSA) has introduced a software package said to allow IBM Personal Computers or Personal System/2s to communicate over ordinary asynchronous connections using IBM's LU6.2 peer-to-peer protocol.

Async/APPC provides PC-to-PC connectivity through standard serial asynchronous ports and dial-up modems. Two PCs running Async/APPC can also communicate via a hard-wire connection through their serial ports without modems.

The product costs $285 including NSA's Assist development tool kit.

NSA, 22982 Mill Creek, Laguna Hills, Calif. 92653. 714-768-4013.

Diagnostic equipment

A tool designed for testing the cable and monitoring traffic on local-area networks (LAN) has been announced by **Tektronix, Inc.'s Communications Network Analyzers Division.**

The **TMA802** media analyzer is said to test LANs with four user-selectable impedance values that match the entire family of IEEE 80 LANs. The TMS802 offers three modes of operation. Monitor mode provides a direct indication of network utiliziation, stand-alone mode reports the status of the cable, and scope mode provides a view of the entire network.

The TMS802 can test coaxial- or twisted-pair-based LANs. It costs $2,495.

Tektronix, P.O. Box 1197, Redmond, Ore. 97077 503-923-4415.

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SYSTEMS & PERIPHERALS

HARD TALK

James Connolly

Resurrection vs. redemption

Question No. 1 has been answered. No, Unisys does not plan to leave its 1100 series mainframe users high and dry.

However, Question No. 2 is: Will Unisys move fast enough to keep those customers happy and attract new users to the 1100s?

Since the company was formed last year through Burroughs' acquisition of Sperry, Unisys had promised to maintain two mainframe lines, the Sperry 1100 and the Burroughs A series.

The A series has been enhanced from top to bottom during the past few years, first by Burroughs and then by the merged company. But the 1100s have been sitting idle, even under Sperry management, ever since the high-end 1100/90 models were introduced in 1983. Other than software tuning and the introduction of peripherals and memory chips, the only action in the 1100 arena in recent years had been the announcement of the low-end 2200 series.

Then, earlier this month, Unisys announced a special

Continued on page 60

New roles may loom for IBM vector facility

Expansion from scientific and engineering computing into data base acceleration a possibility

BY STANLEY GIBSON
CW STAFF

Introduced in 1986 to speed math operations on the 3090 mainframe line, IBM's vector facility could be destined for a larger role. Not only might IBM offer the facility on a wider range of its 370-architecture machines as it expands its push into scientific and engineering markets, but the company may adapt it for general markets.

Some observers of the high-end computing arena said they believe the vector facility could be the basis of a data base accelerator for use with IBM's DB2.

Because IBM's MVS operating system includes the instructions that are necessary to run the vector facility, IBM could offer the feature on 370-type systems other than the 3090, such as the 4381 and high-end 9370 or their successors.

"The vector facility will be strategically important. IBM needs to make sure it is growing in new areas — engineering, for example," said Vicki Brown, an analyst at International Data Corp. (IDC) in Framingham, Mass. Brown predicted that by 1990, the vector facility will be offered across the 370 product line.

Uniprocessor 3090 models, such as the 120E, 150E and 180E, can support one vector facility, but multiprocessor 3090s can have one installed on each processing unit.

Thus, a dyadic Model 200E can support two vector facilities; a six-processor 3090 Model 600E can support six vector facilities. The facility is priced at $370,000 for the first order and $230,000 for subsequent orders.

According to Ed Robbins, director of scientific and technical computing for IBM's Information Systems Group, engineering and scientific computing represents 20% of the total processing market and is growing at 18% per year.

Attractive option

IDC's Brown noted that at a time when IBM's traditional markets are not growing very fast, the engineering and scientific market presents an attractive opportunity to a company hungry for faster growth.

Bob Djurdjevic, president of Annex Research in Phoenix, sees the vector facility as a way for IBM to defend itself against Digital Equipment Corp. by targeting DEC's scientific and engineering market stronghold. He added that he does not believe the vector facility has sold very well so far in most markets.

IBM declined to offer specific figures on the number of vector facilities sold and would only say that most have been shipped to engineering and scientific users.

However, Omri Serlin, president of Itom International Co. in Los Altos, Calif., said IBM told him that 200 to 250 vector facilities have been installed on some 140 3090s. Serlin added that he does not believe IBM is satisfied with its sales progress to date in

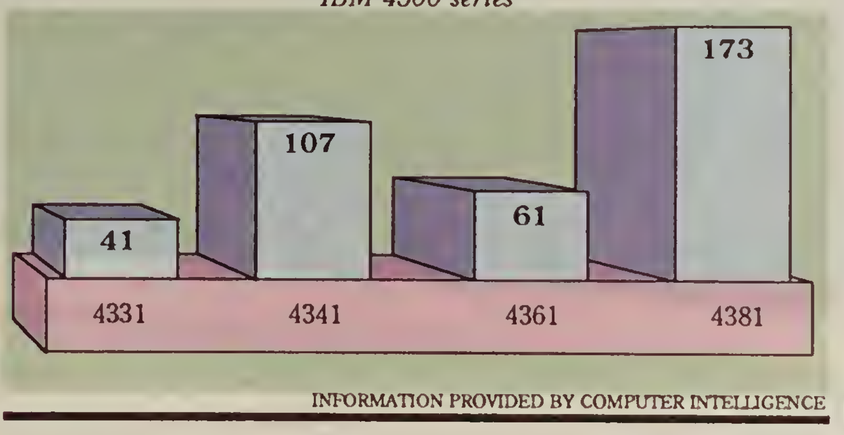
Continued on page 64

Inside

- IBM removes disk drive limitations for System/38. Page 60.
- Locom offers add-in memory enhancement product for two IBM System/36 models. Page 68.

Data View

Average number of terminals
IBM 4300 series



INFORMATION PROVIDED BY COMPUTER INTELLIGENCE

Motorola adds its 68030 to line of minis

CUPERTINO, Calif. — Motorola Computer Systems, Inc. plans to implement the latest microprocessor from its parent company, Motorola, Inc., in several new models of the computer division's System 8000 line.

The division announced it will add Motorola 68030-based models to existing Motorola 68020-based System 8000 models.

The new mid-range Model 430 and high-end Model 630 are based on the 25-MHz 32-bit 68030 that Motorola recently moved into production. Like the earlier System 8000 Models 100 and 400E, the new models are built around the VMEbus and run AT&T Unix System V, Release 3. Motorola also an-

Continued on page 64

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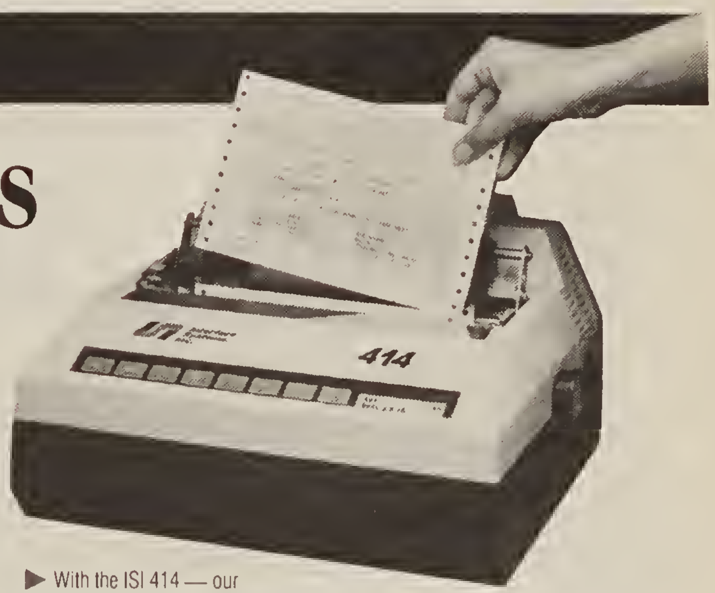

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HARD BITS

System/38 disk drive limitations removed

IBM has removed limits on the number of its 9332 and 9335 disk drives that can be attached to large IBM System/38 models. The company said last month that attachment of third and fourth strings is available as a feature on System/38 Models 400, 600 and 700. IBM said attachment of the extra strings previously required removal of an installed workstation controller from the fourth position.

The attachment features cost $5,250 for the third string and $3,750 for the fourth string. IBM also launched a 15% promotional discount for customers who buy four or more 9332 Model 400 devices. With the discount, four of the 400M-byte drives cost $47,600. The discount applies to machines ordered before Dec. 31 and scheduled for shipment by Jan. 29.

Tandem Computers, Inc. recently expanded its role in the Unix world by signing joint marketing agreements with two suppliers of applications for use with Tandem's LXN Unix-based minicomputer. The agreements are with **Action Software Corp.** in San Diego, which develops applications for the hospitality and airline industries, and **Teknekron Infoswitch Corp.** in Richardson, Texas, which will supply turnkey telemarketing systems.

Harris Corp.'s Computer Systems Division extended the OEM contract under which it provides **Marc Software International, Inc.**'s **Wordmarc** word processing software on the Harris CX line of Unix-based systems. Harris also signed a joint marketing contract with **Rapitech Systems, Inc.** in Suffern, N.Y., to sell Rapitech's Conversionware language-conversion software technology with Harris HCX systems.

Datek Information Services, a market research company in Newtonville, Mass., recently named the **Hewlett-Packard Co.** Laserjet II as its printer of the year. The nonimpact printer was judged to have had the greatest impact on the industry during the previous year.

IBM fellow John Cocke won this year's **Association for Computing Machinery's A.M. Turing Award** at the 1987 Fall Joint Computer Conference. The award, which honors technical contributions in computing, was given to Cocke for his work in the development of reduced instruction set computing, design and theory of compilers and architecture of large systems.

Connolly

CONTINUED FROM PAGE 57

1100/94 designed to boost throughput in transaction processing environments.

There are a couple of strikes against that move, but the announcement gave Unisys a chance to reaffirm support for the 1100s and fueled new discussions of what Unisys can offer its high-end 1100 customers.

One strike is the fact that the 1100/94 Model II Turbo is not scheduled for delivery for more than a year. The second problem, conceded even by Unisys officials, is that it may not be cost-effective to field upgrade an 1100/94 to the new model, which means the Turbo is suited for companies that are growing into the 1100/94 and want a Turbo to replace a smaller 1100/90 or for companies willing to endure a total system replacement for a 25% gain.

Not all bad

But there is also reason for optimism. Analyst Michael Geran of E. F. Hutton & Co. in New York expects the 1100 development cycle to speed up, driven by the former Burroughs' management team. He notes that Unisys has development teams working to expand high-end 1100/90 configurations from four CPUs to six or eight processors.

At the same time, those developers are working on a more powerful version of the basic 1100/90 processor for delivery in 1988 and a successor processor for the 1990s, code-named Mercury.

Unisys wants to keep most users happy with these projects, and they probably will. But the vendor still faces roadblocks. Unisys must deal with the fact, or at least the perception, that the 1100/90 has fallen behind the A series and competitive offerings such as the IBM 3090 in terms of power.

If a large bank sees a greater growth path in the IBM world, including the IBM plug-compatible market, it may use that as a reason to abandon Unisys.

But even if Unisys holds onto its base of almost 1,000 1100/90 processors, the vendor must find a way to attract new customers, not only to the 1100 line but also to the A series.

Unisys cannot afford to lose a site here and a site there without finding replacements. And in order to do that, the company will have to keep fresh faces on both product lines.

Connolly is *Computerworld's* senior editor, systems & peripherals.

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Lines/Page	66-88	66-88
Twinax	Yes	Yes
Printer Type	Impact	Non-Impact
Protocol	5225	5225

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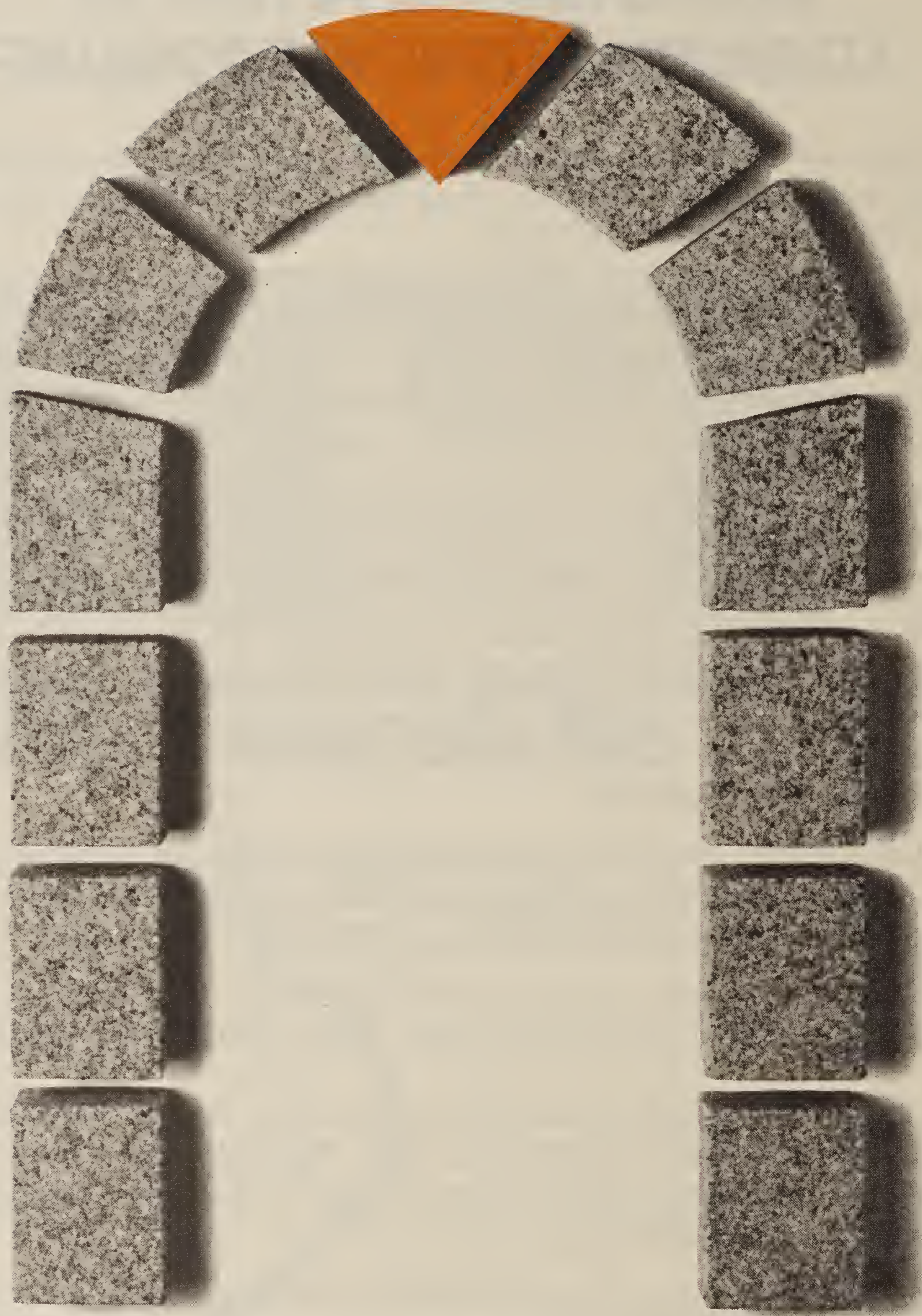

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IBM vector

CONTINUED FROM PAGE 57

the vector facility.

If the responses of two major commercial users are typical, the vector facility has not yet found its way into the heartland of IBM accounts.

"We don't need it. It's inappropriate for our needs. Maybe the London School of Economics needs it for financial modeling, but not us," said George DiNardo, executive vice-president of Mellon Bank NA in Pittsburgh.

Bernard A. Weinstein, chief information officer at E. F. Hutton & Co., said a primarily retail brokerage firm such as E. F. Hutton has no need for the vector facility. He suggested, however, that investment banking firms might find the feature useful.

House calls

However, if mainstream users are not coming to the vector facility, IBM could bring the facility to them. One MIS manager with large IBM systems said IBM has indicated to him that the vector facility will be used to speed up DB2.

Asked about this, IBM's Robbins acknowledged that IBM is looking into that possibility.

Per Flaaten, an industry analyst at Arthur Andersen & Co. in Chicago, said if the vector facility is brought to small mainframes and mid-range systems, it could be widely used for decision support and statistical modeling. Spreadsheets would also be a natural, he added.

Serlin said IBM is working on a data base accelerator to speed data base queries, an effort that has been motivated by the success of Teradata Corp., which sells a relational data base machine that connects to IBM mainframes.

"It only makes sense in a relational data base environment, where the processing load is heavy," Serlin said.

In a relational environment, he explained, users enter requests in high-level abstractions that need to be translated into processing at lower levels. A power boost would be useful to speed that process, he said.

"The relational thing cries out for vector support. This is a real hot topic, and it will go on for years," said Frederic Withington, an independent consultant based in New York. He said it is a good bet that IBM will bring vector support to DB2.

"It is proven that the vector processor works with relational data bases, and IBM is committed to DB2," he said.

Logical processing

Withington explained that data base relations can be represented by vectors, but they must be processed logically, not as floating-point operations in the manner that mathematical calculations are.

This would require different Thermal Conduction Modules (TCM) than those currently used by IBM's vector facility. But the TCMs needed would be simpler and cheaper than the ones now in use to do floating-point calculations, he said.

Other components of the vector facility, such as the MVS code, could remain the same, Withington said.

He added, however, that a special edition of DB2 would be required, which would "wake up" the vector facility by flagging vectorizable operations.

"Data base machines are a coming product class," said Withington, adding that Nucleus International in Santa Monica Calif., in which he holds an investment interest, is building a vector accelerator for data base operations.

Motorola

CONTINUED FROM PAGE 57

nounced the Model 150, which is based on the 68020.

The System 8000 family is aimed at small businesses and large corporate work group environments.

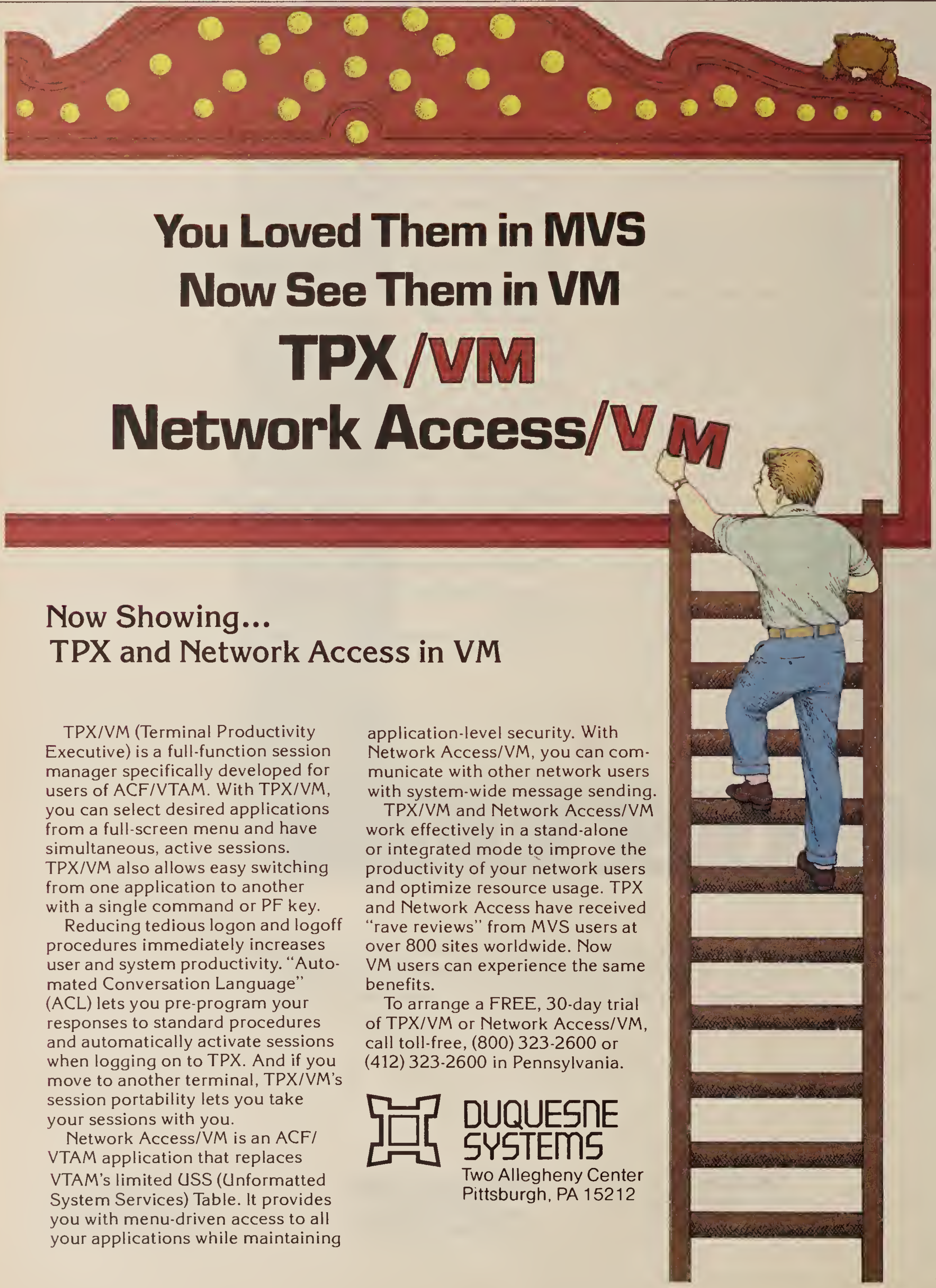
The Model 430 was designed for mid-range work groups with 12 to 50 users and features 64K bytes of cache memory. It is an extension of the Model 400E and doubles the Model 400E's performance, according to Motorola. The Model 430 has a 12-slot VMEbus and supports up to four fixed disk drives, 50 workstations, 12 printers and a nine-track tape drive.

It is scheduled to be available next summer and cost between $32,000 and $75,000.

The Model 630 is intended for high-end work groups of 30 to 66 users and provides twice the transaction processing performance of a comparable 68020-based system, according to Motorola. It has a 20-slot VMEbus and supports six fixed disk drives, 2.5G bytes of external disk storage, two floppy disk drives, 66 workstations, 12 printers, a nine-track tape drive and a 120M-byte streaming tape drive. Priced between $40,000 and $100,000, it is scheduled to be available during the summer.

The Model 150 was designed for small business environments such as remote offices and departmental work groups of up to four users. It features an integrated 68020 processor module with 4M bytes of on-board memory. The company said consolidation of the CPU and memory on a single board leaves another VMEbus slot free to allow the Model 150 to concurrently support local-area networking and wide-area networking.

The Model 150 is based on a 16.67-MHz 68020 and has a six-slot VMEbus. It supports one hard disk drive, one floppy disk drive and a streaming tape drive. Scheduled to ship in March, it is priced from $10,000 to $25,000.



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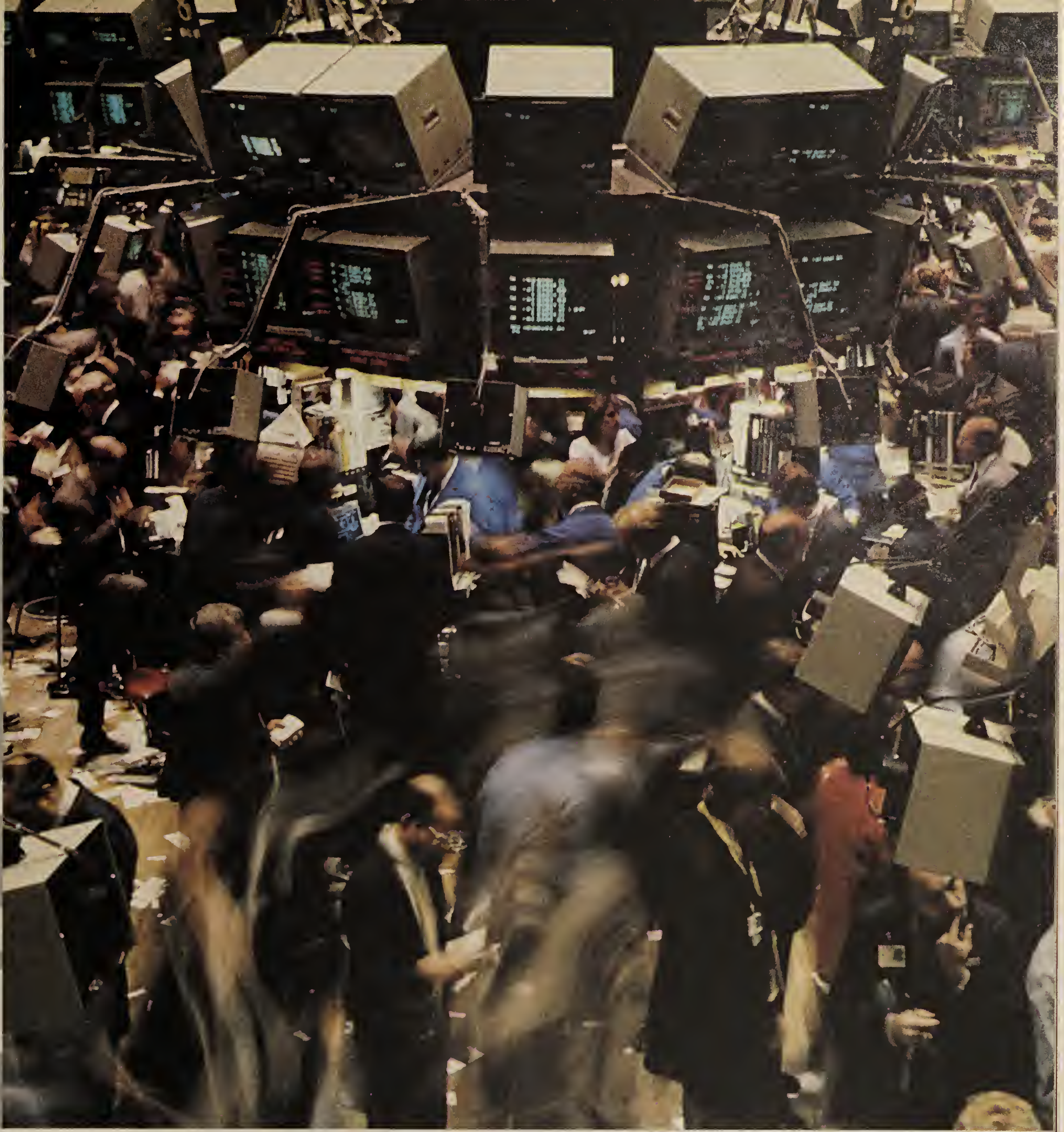

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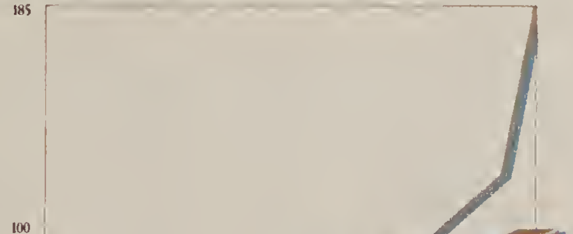

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NEW PRODUCTS

Processors

LCM-360, an add-in memory enhancement product for the IBM System/36 Models 5360 and 5362, has been announced by **Locom Corp.**

The product is said to use 256K-byte dynamic random-access memory technology on plug-in storage cards. LCM-360 is installed directly into IBM memory card locations.

LCM-360 costs $2,500 per megabyte and $1,500 per 512K bytes.

Locom, 2350 Bering Drive, San Jose, Calif. 95131. 408-942-1414.

A family of memory boards for the IBM System/36 Model D minicomputer has been announced by **Decision Data Computer Corp.**

The **Memory Xtender/36** plug-compatible boards are available with 1,024K, 2,048K or 4,096K bytes of random-access memory. They all feature an off-line switch for isolating a memory module from the system and full-board diagnostics.

Prices for the 1M-, 2M- and 4M-byte boards are $2,475, $4,900 and $8,500, respectively.

Decision Data, 400 Horsham Road, Horsham, Pa. 19044. 215-674-3300.

Data storage

An upgradeable ½-in. tape coupler has been announced by **Micro Technology, Inc.**

The **MSV25** is a dual wide board supporting Digital Equipment Corp.'s TSV05 and TS11 tape emulation in the standard configuration.

According to the vendor, the MSV25 can be upgraded via a firmware change to support TMSCP.

The coupler is compatible with all Q-bus-based processors and supports transfer rates in excess of 1,000K byte/sec.

The MSV5 costs $1,295.

Micro Technology, 1620 Miraloma Ave., Placentia, Calif. 92670.

Maximum Strategy, Inc. has announced VMEbus compatibility for its **Strategy 1** disk drive controller.

The Strategy 1 controller is said to be capable of utilizing both enhanced small device interface and storage module device rigid disk drives. According to the vendor, the controller can provide subsystem storage capacities from 300M to 16G bytes and sustained data transfer rates from 3.5M to 10M byte/sec.

It also features a 48-bit error-correction polynomial that is stored with every 1,024 bytes written to disk.

The VMEbus interface package is priced at $5,000. The Strategy 1 controller costs $19,000.

Maximum Strategy, 160 E. Virginia St., San Jose, Calif. 95112. 408-275-1209.

Terminals

Qume Corp. has reduced the pricing on its **Plus** line of video terminals.

Included are the QVT 101 Plus and QVT 119 Plus ASCII terminals and the QVT 203 Plus ANSI-compatible terminal designed for Unix environments. All three feature 14-in. screens, four user-programmable keys and tilt-and-swivel monitors.

Pricing is now $399 for the QVT 101 Plus; $525 for the QVT 119 Plus; and $575 for the QVT 203 Plus.

Qume also reduced the price of its 90 char./sec. **Sprint 11/90 Plus** daisywheel printer to $1,695.

Qume, 2350 Qume Drive, San Jose, Calif. 95131. 408-432-4000.

NEC Home Electronics, Inc. has announced the **Multisync II** multiscanning monitor.

The Multisync II features a 14-in. CRT and 800- by 560-pixel maximum resolution.

It works with such standards as IBM's Color Graphics Adapter and Video Graphics Array and Apple Computer, Inc.'s Macintosh II.

It is also compatible with monochrome display adapter and Hercules Computer Technology, Inc. standards.

Other features include three-way color switch and image auto-sizing when used with the IBM Personal System/2; automatic vertical hold; automatic Transistor-Transistor Logic and analog input signal selection; and front-mounted controls.

The Multisync II costs $899.

NEC Home Electronics, 1255 Michael Drive, Wood Dale, Ill. 60191. 312-860-9500.

Printers/Plotters

QMS, Inc. has announced the **QMS-PS 810** laser printer based on the Canon, Inc. SX engine and supporting the Adobe Systems, Inc. Postscript page-description language.

The QMS-PS 810 features a controller including 2M bytes of random-access memory expandable to 3M bytes, 1M byte of read-only memory and a 16-MHz Motorola, Inc. 68000 math processing unit. It supports the 35 standard Postscript typefaces.

The printer operates at 8 page/min. and features serial, parallel and Apple Computer, Inc. Appletalk interfaces.

The QMS-PS 810 costs $5,495.

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Not again! The messy business of planning

Of 200 companies surveyed, not one rated a strictly formal planning process as effective

DON VANDERBEEK

BY JOHN BLAIR

I love clients. All clients. But some make me work at it harder than others.

For instance, when a client says, "What we need is a plan for MIS — a three-year, or even a five-year, plan — so we can get on with our work and not have to deal with all the interruptions and redirections from management and end users," the sound that emanates from me is that of gritting teeth.

And sometimes the sound is so loud that I don't even hear them add, " . . . like it used to be."

MIS is rushing, creeping or being pushed into the mainstream of business, and it's a messy affair. The market changes, the economy changes, the vendors change and the customers change, management changes, the laws change — all at random. Yet we in MIS still persist in trying to develop a five-year plan that will last for five years.

And we should. So what if the trail that planning leaves behind looks like an overflowing laundry basket?

'. . . of MIS and men'

To be effective, a long-range plan must suffer the indignities of never-ending real-life changes. Confusion, disorder and constant trips back to the drawing board earmark the process of long-range planning.

Strategic planners, take heart. An ongoing survey of planning approaches used by U.S. information systems organizations shows that the best-laid plans are typically informal and often messy.

The two-year study has surveyed nearly 200 companies. Most of these organizations admit they are disorganized and approach planning differently every year. The participants represent a cross-section of organizations including Foster Parents International, the U.S. Army Force Command, city

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Blair is an independent consultant in Carefree, Ariz., and a member of The Dooley Group, a loose federation of consultants. He is the former MIS director of Synertek, Inc. and now leads seminars in information systems planning and technical architecture.

- **It's that time of year again**
- **Noisy, real-world planning environment**
- **How not to plan vs. how to not plan**

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IBM offered American President Companies (APC) computer compatibility from PC to mainframe as well as service and support worldwide. CBX switching systems, developed by ROLM, gave APC advanced voice and data handling technology. And IBM NetView™ software provided centralized network management.

To create an enterprise-wide telecommunications system, APC used satellite and

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run your shipping business over here?

direct cable connections to link IBM 3090 mainframes at a California data center with hundreds of IBM 3270 display terminals and IBM PCs scattered around the globe.

Real-time access to data on a continuous basis, from anywhere in the network, gave APC greater flexibility in ship deployment, truck and train scheduling, all of which cut cargo transportation time.

Moreover, APC uses the IBM Information Network to extend data to customers. Using nationwide dial access and their own personal computers, companies doing business with APC can track merchandise movements and pinpoint delivery dates, reducing warehousing and inventory costs.

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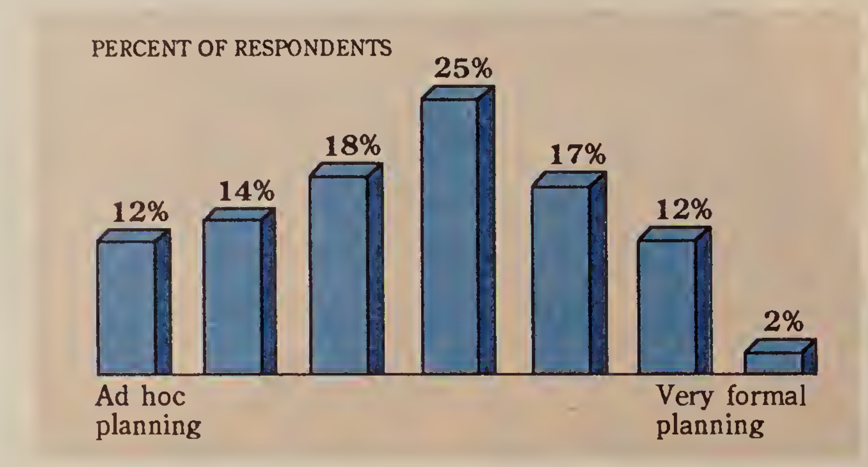
governments, hospitals and military and consumer electronics manufacturers. The respondents are primarily senior MIS executives or managers reporting directly to them. The average company has an MIS budget of $23 million and employs just more than 100 people.

When asked if a formal information systems planning methodology is used, 48% of respondents answered no. Almost as many, 39%, said they use an internally developed plan. In terms of the four classic planning approaches available, 8% of the companies use Critical Success Factors, 5% use Business Systems Planning, 2% use Stages of Growth and 2% use Method/I.

The MIS planning staff of one major consumer products company had stopped planning entirely. The reason given — and, incredibly, accepted by the executive board — was that the old methods of planning no longer worked. The planning staff declared a one-year moratorium, during which time it intended to research available alternatives, select one, prepare internal training and document the methodology. Now, 18 months after the initial one-year hiatus, the company continues to dodge the issue, saying that new methods are still under study.

How formal is your planning process?

Of 200 U.S. organizations with average MIS budgets of more than $23 million, the majority ranks their planning process on the informal end of the scale



INFORMATION PROVIDED BY A J. BLAIR CONSULTING SURVEY

"Messy," or "informal," does not mean "ineffective" in this case. Businesses that report financial results better than the industry average also consistently report using informal corporate planning processes. Companies that use very formal corporate planning processes rarely report a financial performance of better than average.

Furthermore, no organization in the study that uses a strictly formal corporate planning process rates the process as effective. Instead, a moderate level of formality most often results in a high level of planning effectiveness (see chart above).

The comments scrawled in the survey margins tell the real tale. A planner at an electric utility says, "We spend most of the fourth quarter budgeting and rebudgeting. The numbers have to be just right. We never talk about why we do projects or about the corporate strategy."

Planning meets Godzilla

Change — real life — can really muck up a beautiful planning cycle. Take the following typical planning cycle, based on the long-range planning process used at Honeywell Bull, Inc.

First quarter. Planning model: Evaluate last year's results and the economic and market factors likely to come into play along the planning horizon; generate assumptions, and develop business scenarios.

Real world: The model is generally followed, but economic assumptions and market factors are merely extrapolated from the past two years.

Second quarter. Planning model: Generate major business and product programs; prepare revenue, expense and capital projections plus a risk analysis.

Real world: A latent component problem appears in a product introduced last year; field service scrambles to find enough spares to keep systems up; manufacturing stops all production currently using the part; engineering and quality control work to characterize failure; management forces vendor to change part design and initiates a new design to remove part from production; finance blows fuses figuring possible effect on earnings.

Third quarter. Planning model: Focus on first two years of long-range plan, and develop detailed projects and work plans to support budgets; review results with corporate staff.

Real world: A supplier is found to make a critical part; the supplier insists on a getting $2.5 million up-front payment for the tooling changes; the company's stock price drops as more and more rumors develop; security analysts insist on a briefing with company executives; a round-robin refurbishment program is developed for systems with the failing part.

Fourth quarter. Planning model: Prepare and review operating budgets for Years 1 and 2 of long-range plan; do detailed work planning and manpower balancing for Year 1.

Real world: Component failure problem starts to come under control; earnings for the current year are projected to be flat or down slightly in the face of a projection for a 50% increase in operating plan; accrual for future product complaints of $3 million are considered; development attention now shifts back to future products. The expectation is that a three-month delay has occurred.

The long range plan? MIS develops the next year's budgets with the full recognition of a severe and continuing product liability.

Despite this negative example, the event that wrecks the planning cycle could just as well

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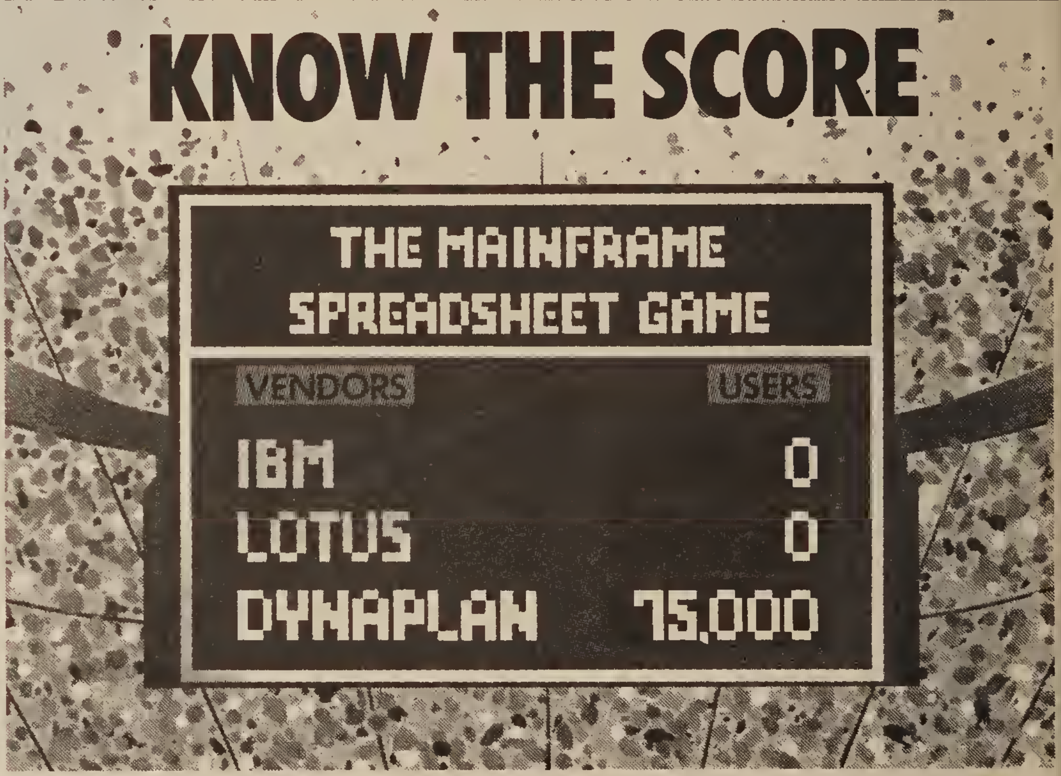

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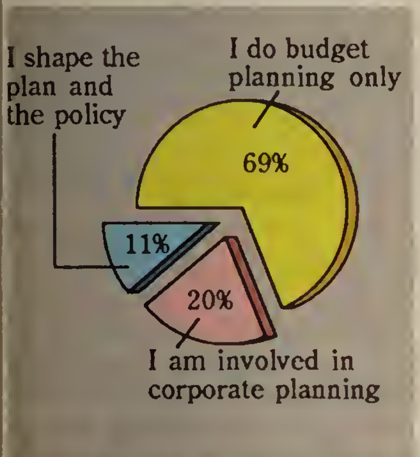
have been a positive one. Suppose your chief competitor experienced the component problem and your company received a rush of orders that, if filled, would have doubled your sales volume in the third and fourth quarters and upped the next year's projections by 40%. Your plans still would have to be trashed and redone.

Want other examples? Remember when Genentech, Inc. failed to receive Food and Drug Administration approval in June? Then there was the time Chrysler Corp. couldn't meet the demand for minivans. Toshiba Corp. sold restricted material to the Communist Bloc. Paul Volcker resigned. The market ho-hummed IBM's Personal System/2. Apple Computer, Inc. didn't order enough color monitors for the Macintosh SE.

MIS's role in planning

200 MIS executives rated their own roles in corporate planning



INFORMATION PROVIDED BY A J. BLAIR CONSULTING SURVEY

Planning approaches must deal with the noisy and unpredictable real world.

Good practice?

An inherent difficulty of strategic planning is that wrong answers often come disguised as right ones. The disguise is especially deceiving if you expend a large and logical effort to come up with a long-range plan.

For example, the Stages of Growth approach to planning says that as an organization matures, its portfolio of applications should mature as well. You perform an exhaustive analysis to compare your "applications coverage"-with an industry average — established standards of "good practice." Are your business functions automated as fully as those in the model company for your industry?

The planning team analyzes, projects and validates each application by weighing technical quality against functional quality. It turns out that good practice, in this case, dictates that 41 of the 45 functions in inventory control be automated. You find only 38 in your organization. So you sit down and set priorities for applications that deviate from benchmark norms.

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Now we all know what to do in MIS: Automate all functions that should be automated, and correct the quality of already automated functions. Voila, a five-year plan.

We wish.

Step by step by step

The process is seductive. Every step is logical. The sequence of steps is logical. The process of drawing conclusions from the data is logical. A plan to move us toward good industry practice can't be faulted.

Then, while you're not looking, your competitor develops a better inventory controls system, eliminates regional warehousing and promises on-time delivery or free shipments.

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Steer clear

Steering committees are another formula born out of the hope of escaping the planning dilemma. Steering committees for MIS, composed of senior executives, are often seen as a way to filter the noise out of planning data.

In the seminars we conduct on planning, the issue of using steering committees comes up frequently. Of the 55% of seminar attendees who assemble a steering committee for MIS, only one-third say it works well. In fact, companies with steering committees that have been in operation three or more years show below-average financial performance.

The steering committee concept attempts to force peer-level senior management to make open, objective choices about guarding the relative importance of their various functions. But the horse-trading, wheeling, dealing and compromising that makes most organizations work never operates well in the open. Steering committee theory attempts to defy a law of nature.

> BUSINESSES that report financial results better than the industry average also consistently report using informal corporate planning processes. Companies that use very formal corporate planning processes rarely report a financial performance of better than average.

Muddling through

Faced with ineffective planning tools and an executive management unwilling or unable to deal well with MIS, our guerrilla instincts tend to surface.

MIS's business is problems. Yet only 55% of the survey respondents indicate they actually budget for contingency in any way. Only 17% budget openly for contingency. The others? They have a set of cushions, pads and soft accounts.

Those who do not — or who are not allowed to — budget for contingency accept problems stoically. One fellow says, "We don't plan for contingency; it just happens."

Another frustrated respondent scribbled in the survey margin, "We are not allowed to have problems or to accept risks."

Many MIS organizations are also forced to explore new techniques and new technologies in convoluted ways. Research and development is often handled behind the scenes and off the balance sheet. One MIS executive noted, "We do R&D, but we don't call it that in the budget." Only 50% say they perform R&D even informally.

Another MIS manager said, "We are only allowed to work on projects that lead to production systems."

An information systems planner noted, "We are forbidden to exceed budget or fail to meet deadlines. As a result, some of our production releases are content-free."

Two out of three left out

Although 28% of the MIS executives polled say they report to the chief executive officer, only 11%, by their own admission, "shape strategy or create policy" at the corporate level. Translation: Nearly 66% of the MIS executives who report to the CEO are not really a part of the senior management team. (See chart page 73.)

For me, this news brought back a flood of long-buried memories of frustration. As senior MIS executive on the official organization chart, I reported to the CEO. With a 100% charge-out policy, I really reported to the three line vice-presidents who paid most of the MIS bills.

I would have answered the survey with the 70% who said "included in budgeting but not corporate strategies." Almost 70% admitted to dealing with budget issues only.

One frustrated mid-level MIS manager, commenting on his boss, added a fourth category: "Doesn't know it [corporate planning] is going on and wouldn't understand why."

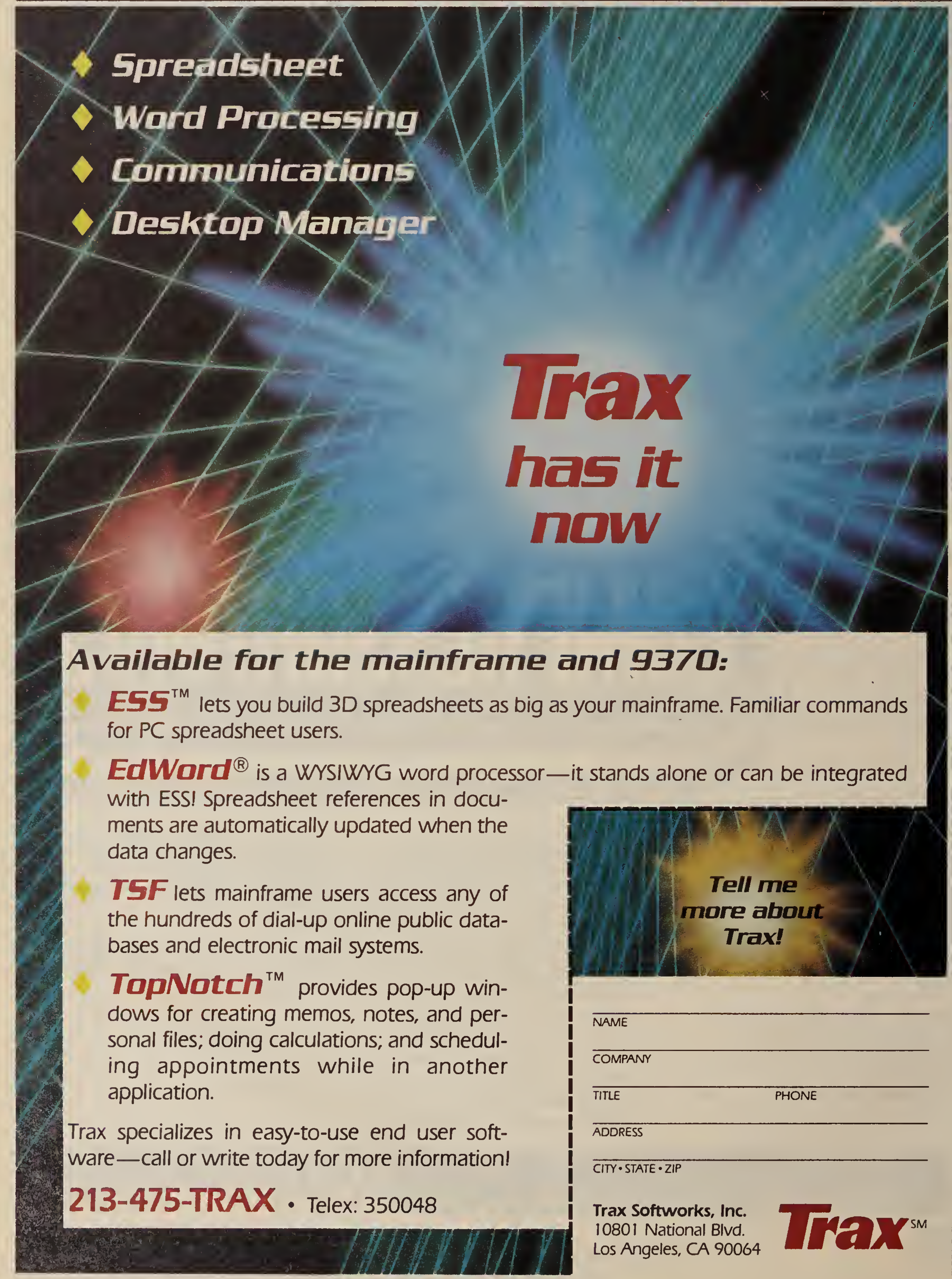
Another section of the survey addressed the issues in which the senior executives did become involved directly. A little more than 25% of the CEOs were directly involved in the selection of the senior MIS executive. Sixteen percent of the CEOs were involved in MIS budget negotiations. My interpretation is that MIS executives are either quite autonomous or do not have much direct interaction with the CEO. (Remember, nearly 30% report to the CEO.) Once the MIS executive is selected and the budget is set, the CEO leaves them alone.

Executive reaction

The executives in several of the companies surveyed are attempting to create a closer working relationship between the MIS organization and the line business functions.

Replacing the top MIS executive is a frequent move. Of the executives interviewed, more than 40% had spent the majority of their careers outside the MIS

Continued on page 76



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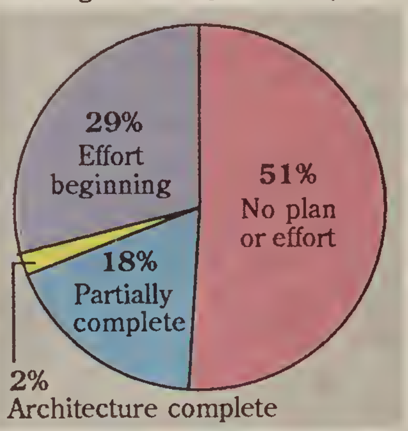
Bulwark or just busywork?

From the initial study of ways to make information systems more effective came the idea of harmoniously aligning the information technology with the business configuration. If the business is centralized, the information systems should be, too. If the business is highly distributed, with autonomous units, information systems should mirror distribution.

Information architecture

Of the organizations that are working on a unified architecture, 88% began in the past three years



INFORMATION PROVIDED BY A J. BLAIR CONSULTING SURVEY
CW CHART

The idea of an overall technical architecture began to emerge in a number of firms around 1984. Our survey asked, "Is there a formal effort under way to establish an information systems architecture?" and "What is the current status of the effort?" Less than half the companies surveyed started formal information systems architecture efforts within the past three years.

The idea of an information systems architecture is still a cloudy concept in most organizations. Nearly 60% of those working on one responded, "Concepts are still being formulated."

The question is, Why are information systems groups working on information systems architectures? There's at least one cynic — the chief executive officer of a large bank holding company — who claims, "Information systems architectures are things that MIS people work on to spend money and avoid doing real work."

But of those who answered the question, "What are the expected results of your architecture effort?" more than 70% responded as the MIS executive at one of the divested Bell operating companies did: "[We want to] direct the use of technology to ensure long-term profitability, market responsiveness and [internal] efficiency."

A subset of our study tried to pin down which technology elements should be planned, designed and managed in harmony. Six emerged: data, applications, processors, end-user interfaces, communications and systems software. These provide a definition of the technical delivery platform.

JOHN BLAIR

Planning

FROM PAGE 74

function. Based on recent telephone calls from displaced MIS executives, one suspects the number is increasing.

Changing reporting relationships is often the second favorite move. Only 31% of those surveyed reported through the financial function. Twenty-eight percent reported to a CEO or equivalent. The other 41% were scattered across the organization.

Work within the system

To plan well, the long-range strategist needs a high tolerance for noise, disorder and change. What MIS planning approach seems to work best?

From the results of the survey, the single most effective approach seems to be to work within the system.

The shape and pace of planning functions should follow the shape and pace of the business functions they plan for, not vice versa. In this mode, the planning emphasis can adapt to follow shifting trends, competitors, markets, ideas, financial results and projects.

Effective planning consists of a series of discussions between those responsible for the work. The structure that is imposed on such discussions should stay in the background and never be a highly visible or restrictive part of the planning work.

For example, a wholesale products manufacturer had successfully started to blend business planning and information systems planning. A false start put the emphasis on new technology "helping" the business. The initial arrogant approach of the MIS group — "We are here from MIS, and we are going to help you" — was amended.

Cordial working relationships started to develop when one MIS staff member was asked to sit in on a divisional planning meeting — not as an MIS representative but as a guest of the general manager and someone that was experienced in the business.

It turned out that MIS had some sales history data that the division needed but didn't know about. The line managers invited the MIS manager to their next planning meeting.

To smooth the entry of MIS into the planning processes of the firm's other divisions, the company went on to develop a business sensitivity seminar within MIS. It was a prerequisite for any involvement in business planning.

The process continues to unfold. Each organization (MIS and the line functions) continues to increase the trust it has in the other. The division managers of this company claimed a $9 million savings in warehouse and distribution costs, which they attributed at least in part to this new approach to planning.

Noise and chaos

The idea of blending MIS planning into the plans of the rest of the organization should not come as a shock or as a surprise.

Dayton-Hudson Corp. integrated business planning and information systems planning nearly a decade ago. Not coincidentally, Dayton-Hudson always ranks high in polls of good places to work.

The effective planning approaches today build on a high involvement in the business. Two measures can gauge the effectiveness of any planning approach: Does it lead to the right work? Will we use it again?

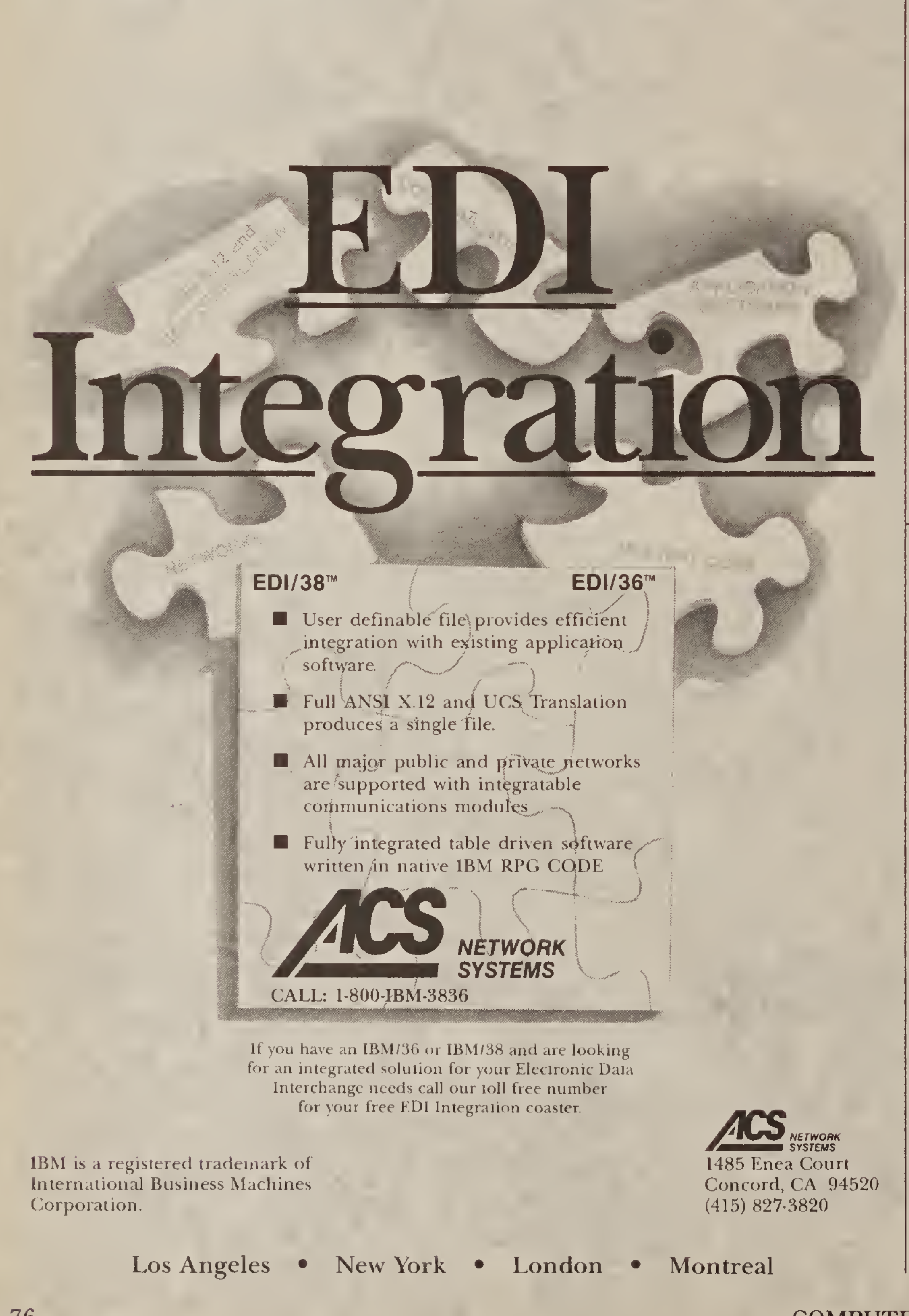
Part and parcel of effective planning is a good, healthy dose of noise and confusion: lots of raucous meetings, reams of conflicting data, fuzzy ideas of the future labeled as visions, short-interval schedules, markets, products, strategies — this is fun!

To my highly structured, well-disciplined MIS friends: Planning isn't like program design. Fast reactions, rapidly changing tactics and making it up as you go along is just fine if the people driving the business think it is fine.

Efficiency carries an incredible cost if it threatens effectiveness or adds a month to the implementation time.

If this kind of advice makes you squirm, stay away from plans and planners. Find people in your organization who feel at home with emerging strategies and who are challenged by vague ideas. Put them in charge of planning.

But to force planning to follow the narrow path of system analysis and program design is limiting for you and your career and potentially dangerous for the whole organization. •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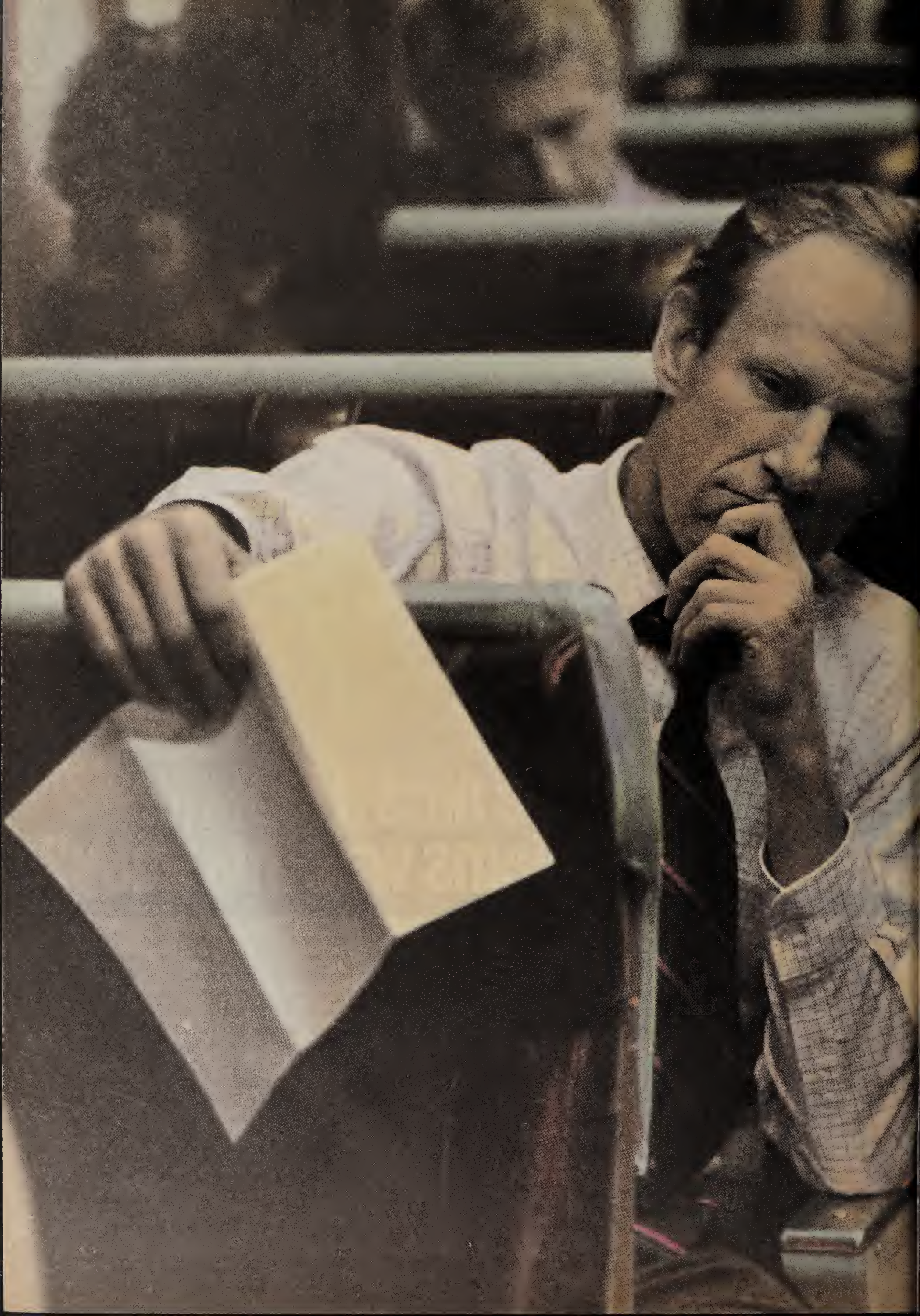

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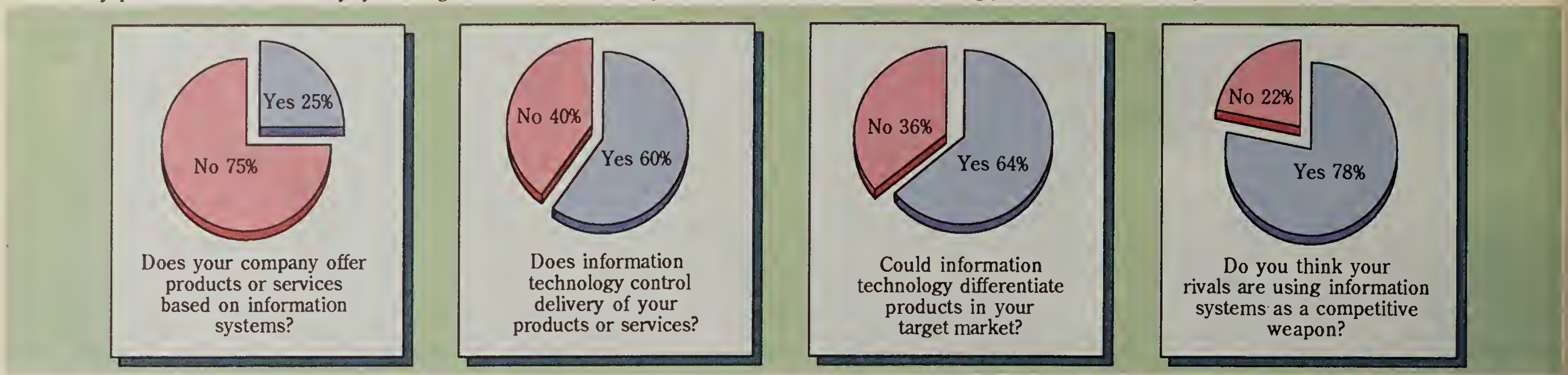
Strategic use of information systems

Preliminary questions show real activity by U.S. organizations to use their systems competitively; closer questioning yields "no comment" responses



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COMMAND ---> f p'<ICS' .a .b                           SCROLL ---> DATA
000062        FIN.
000063    GO TO CICS-CONTROL.
000064    READ-INPUT.
.A           EXEC CICS HANDLE CONDITION MAPFAIL(NOTMODF) NOTFND(NOTFOUND)
000066          ERROR(ERRORS) DUPREC(DUPREC) END-EXEC.
000067       EXEC CICS RECEIVE MAP('XDFHCMB') END-EXEC.
000068       IF EIBTRNID = 'UPDT' THEN
000069          EXEC CICS READ UPDATE DATASET('FILEA') INTO(FILEA)
000070             RIDFLD(NUMB IN COMMAREA) END-EXEC
000071       IF FILEREC IN FILEA NOT = FILEREC IN COMMAREA THEN
000072          MOVE 'FILE ALREADY UPDATED - REENTER' TO MSG10
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      ADDLMENU COB   2560   03/26/86    8:02a
      ASKDANGR COB   1536   03/29/86   10:33a
      ASKTOP   COB   1536   11/25/85   11:07p
      CHGSEL   COB   6144   01/12/87   12:48p
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Taking care of business (in secret)

Many of us harbor the dream of building the next American Hospital Supply Corp. ASAP system or Merrill Lynch & Co. CMA program. And the headlines starring American Airlines Chief Information Officer Max Hopper only serve to feed the dream.

With this dream comes the fear that a competitor will beat us to the punch. According to our survey, 78% of MIS executives think their competitors are or soon will be using information technology as a competitive or strategic tool — evidence of our paranoia (see chart above).

Sixty-four percent of the MIS organizations surveyed said information technology can be used to differentiate their products or services from those of their business rivals.

We are also readying ourselves for "interorganizational systems:" 45% of the companies surveyed have their computers connected to those of their customers, and 23% have their computers connected to those of their vendors.

Too good to tell

A subset, 27 of the 200 surveyed companies, were asked more specifically what strategic systems they either had in place, were working on or were planning. Twenty-four of the 27 gave straight answers, describing their systems in some detail. But the other three responses were more interesting.

One left the entire section blank, as if to say, "None of your business." The other two carefully checked "no activity" in each of the six categories suggested as possible strategic systems.

However, through other sources, I learned that both companies sponsor major efforts within MIS to improve competitiveness through more, better or faster information for their marketing organizations.

This small sample of disinformation may be a much stronger indication of the kind of effort companies are putting into information technology for competitive and strategic purposes — a more accurate gauge than any of the positive responses.

Whatever they are working on, it is too good to talk about.

JOHN BLAIR

MANAGEMENT

TAKING CHARGE

Les Gilliam

The making of a manager

There is an expectation in the information systems field that all professionals should aspire to be managers. In practically all cases, managers get paid more than professionals.

But if a professional doesn't achieve the apparently lofty height of manager, has he failed? Of course not. One of the most damaging and self-perpetuating sources of unnecessary, counterproductive conflict in our business is the promotion of class distinction between manager and professional.

Management and professional work are mutually supporting functions, neither of which can exist without the other. Furthermore, it takes a variety of skilled people to successfully carry out the functions.

Rather than placing more importance on one function, the key is to effectively match people to jobs and then provide motivation and rewards to increase productivity.

If employees are to contribute more to the firm, they should be confident that they have been properly matched to their assignments and that it is in their best interests to do the best they can at their assigned tasks. They must know that their work is important, appreciated and recognized. This only comes through overt action by management.

Continued on page 82

Building systems and careers

Levi Strauss executive seeks snug fit for equipment and people

BY KATHY CHIN LEONG
CW STAFF

Colleagues at Levi Strauss & Co. call Bill Eaton a definite "Type A" personality.

Eaton admits he is a driver, just naturally results-oriented.

"I'm a builder," exclaims Eaton, the clothing maker's vice-president of information systems. "Whether it's building a house, building a computer project or building people's careers, I want to have a part in it. I love to see things happen."

After a decade at Levi Strauss, Eaton, 44, has had the satisfaction of watching a myriad of projects grow from inception to completion.

One of the first was a conversion from IBM System 3 Model 15D computers to on-line Hewlett-Packard Co. HP 3000 minicomputers. This was a corporate milestone that took more than a year to complete and created a unified environment for production, sales and product management.

Ordering on-line

Today, Levi Strauss lets major retailers order apparel via Levilink, a host-to-host information service run by GE Information Services, a division of General Electric Co., and other third-party vendors that has changed the way the company does business.

About 50 retailers send purchase orders through Levilink, and Eaton says the service will continue to grow in popularity and functionality.

While Eaton is direct and tells people what is on his mind, "at the same time, he knows how to relax and have fun," according to Gil Melbardis, Levi Strauss' director of computer-aided merchandising and manufacturing.

But Eaton's idea of fun and relaxation might sound like torture to some. One of his chief loves is restoring sports cars, from rebuilding automobile engines to reupholstering interiors. Be-

Continued on page 83

PROFILE

Bill Eaton

Position: *Vice-president of information systems, Levi Strauss & Co.*

Mission: *Building electronic transaction systems, listening to users, educating executives and shaping careers.*

Data View

With new technologies, many face-to-face meetings are unnecessary, according to two authors writing in Management World, *who say the following types of information should be conveyed face-to-face*

- **Emotional or personal messages.** Whether you are relaying bad news or passing out kudos, nothing beats the personal touch.
- **Discussion or negotiation.** Imagine the snowdrift of paperwork it would take to thoroughly discuss topics like marketing strategy or budgeting.
- **Personal introduction.** When the participants have not met to size each other up, a personal meeting is in order.
- **Important messages.** "Calling the troops together" underscores the importance of your message. Of course, this must not be overused.
- **Brainstorming.** Generating off-the-wall ideas with other people is almost impossible to do when not face to face.

INFORMATION PROVIDED BY GREGORY SALSBURY OF SALSBURY COMMUNICATIONS, INC. AND J. RITTER OF ATLANTIC RICHFIELD CO.
CW CHART: MITCHELL J. HAYES

In search of Stanford grads

PALO ALTO, Calif. — Stanford University plans to launch a service for recruiting managers, engineers and computer professionals that is intended to be more focused than advertising but less expensive than headhunters.

The Stanford Alumni Association is developing a data base containing names of potential job switchers among past students with undergraduate or graduate degrees in engineering, computer science or business.

For an annual subscription fee of $3,500, the association says it will provide companies with candidates for as many as 20 job openings a year, offering about 20 prospects for each one.

To attract smaller companies, Stanford will also allow five searches with no time restriction for $1,800.

Subscribers will be able to vary the level of detail for each request to narrow or widen a field of candidates to about 20, said Mark Jordan, director of the service, which is called Pronet.

It initially will contain about 4,000 names but plans call for having about 10,000 within a year, Jordan said. "We expect everything to be loaded in January, and we'll really be running full tilt in February," he said.

The data base will be broadened to include alumni with degrees in fields other than engineering, computers or business, Jordan said.

About 50 corporations have signed up for discounted, three-year charter subscriptions to Pronet. Most are manufacturers but the list includes Goldman, Sachs, Inc., First National Bank of Chicago and Price Waterhouse.

Creation of Pronet was prompted by suggestions from alumni interested in job openings. Most candidates will not be active job seekers, Jordan said.

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CALENDAR

DEC. 6-12

5th Annual Symposium on Information Transfer. College Station, Texas, Dec. 6-7 — Contact: Information Transfer Symposium, Engineering Technology Dept., Texas A&M University, College Station, Texas 77843.

Sixth Annual Executive Conference. Phoenix, Dec. 6-9 — Contact: The Dooley Group, Suite 109, 50 9th Ave. S., Hopkins, Minn. 55343.

Microcomputer Conference. Chicago, Dec. 7-11 — Contact: Marilyn Helfers, Vice-President, Communications, Financial Managers Society, Inc., Suite 2221, 111 E. Wacker Drive, Chicago, Ill. 60601.

1987 Digital Equipment Computer Users Society (DECUS) **Fall Symposium.** Anaheim, Calif., Dec. 7-11 — Contact: DECUS, U.S. Chapter, BPO2, 219 Boston Post Road, Marlboro, Mass. 01752.

International Data Corp.'s Corporate Computing Conference: DEC vs. IBM, The Challenge Continues. Anaheim, Calif., Dec. 8-9 — Contact: Diane Szretter or Mary Anne Sinville, IDC, Box 9015, 5 Speen St., Framingham, Mass. 01701.

Ada Expo '87. Boston, Dec. 8-10. — Contact: Ada Expo '87, P.O. Box 3867, Frederick, Md. 21701.

Dexpo West 87, DEC-Compatible Exposition. Anaheim, Calif., Dec. 8-10 — Contact: Susan Werlinich, Expoconsul International, Inc., 3 Independence Way, Princeton, N.J. 08540.

Third Aerospace Computer Security Conference: Applying Technology to Systems. Orlando, Fla., Dec. 8-11 — Contact: Joel Levy, Aerospace Computer Security Associates, c/o ORI, Inc., 1375 Piccard Drive, Rockville, Md. 20850.

1987 Computer Measurement Group Conference. Orlando, Fla., Dec. 8-11. — Contact: Ralph S. Terkowitz, Computer Measurement Group, Inc., 6397 Little River Tnpk., Alexandria, Va. 22312.

Frontiers in Computing — International Conference. Amsterdam, Dec. 9-11 — Contact: Frontiers in Computing, c/o CWI, P.O. Box 4079, 1009 AB Amsterdam, The Netherlands.

DEC. 13-19

1987 Winter Simulation Conference. Atlanta, Dec. 14-16 — Contact: Hank Grant, WCS '87, Factrol, Inc., P.O. Box 2569, 2801 Kent Ave., West Lafayette, Ind. 47906.

Winter National Design Engineering Show and Conference. Anaheim, Calif. Dec. 15-17 — Contact: Laura Incerto, Winter National Design Engineering Show, 999 Summer St., Stamford, Conn. 06905.

Advanced Manufacturing Systems Exposition and Conference/West '87. Anaheim, Calif., Dec. 15-17 — Contact: Cahners Exposition Group, Cahners Plaza, P.O. Box 5060, 1350 E. Touhy Ave., Des Plaines, Ill. 60017.

1987 AEC Expo: The Show & Conference for Architects & Engineers. New York, Dec. 16-18 — Contact: Expoconsul International, Inc., 3 Independence Way, Princeton, N.J. 08540.

JAN. 10-16

77th Annual National Retail Merchants Association Convention. New York, Jan. 10-13 — Contact: Registrar, NRMA, c/o Galaxy Conferences, Inc., P.O. Box 3918, Frederick, Md. 21701.

10th Annual Conference on Computer Graphics. San Diego, Jan. 13-15 — Contact: Carol Every, Frost & Sullivan, Inc., 106 Fulton St., New York, N.Y. 10038.

Commtex International '88. New Orleans, Jan. 16-18 — Contact: International Communications Industries Association, 3150 Spring St., Fairfax, Va. 22031.

Gilliam

CONTINUED FROM PAGE 81

This is especially true in guiding the transition from professional to manager, a change that, in most cases, is not easy or immediately successful.

Think of the mind-set of the typical programmer/analyst. He is expected — and paid — to deal with specific details, with exactness, precision and accuracy. Thrust this person into a management role — surrounded by a multitude of circumstances, issues and people problems requiring judgment calls — and you really have a fish out of water.

The professional's mind-set is simply not able to adjust to the change immediately. It takes a great deal of time to make the transition. Some good formal training in how to make the change will be extremely valuable. But the most important ingredient will be his actual experience — accompanied, likely, by several failures.

There are also changes in peer relationships that are often difficult. Having to make difficult decisions that could have a negative impact on long-standing relationships could be a price too high to pay.

What if a professional tried management for a while and didn't like it, or it didn't work out? Whose fault is it — the person who tried it or the one who didn't accurately judge his skills and temperament?

The chief responsibility belongs to management. If, in the end, the change doesn't succeed, management should accept the responsibility and let the professional return to the realm where he can be more successful without blaming him for attempting the transition.

Some people lack an understanding of the difference between management and leadership, whether it be in sales, research, design, operations or another field. A leader in such a field may have no desire or aptitude for management, and the world knows many such people who were not cut out for it.

But don't forget that the application of certain factors should lead to unqualified success in managerial or professional work. Asked how he achieved his success, Olympic track star Jesse Owens said, "I built a ladder of four rungs: determination, dedication, discipline and attitude."

Gilliam is president of Gilliam Associates, a computer and management consulting firm in Ponca City, Okla.

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Levi Strauss

CONTINUED FROM PAGE 81

cause of Eaton, at least three Alpha Romeos, a Datsun 240Z and a Porsche 356A have new leases on life.

Eaton dabbles in other pursuits as well, such as building houses. He and his wife recently finished building one on a 40-acre lot south of San Francisco, a wooded area lush with bobcats, deer and raccoons. While contractors built the basic structure, Eaton wanted to do as much as he could himself.

A career in the apparel industry was never part of Eaton's original design. He joined the U.S. Navy as an ensign in 1966 and expected to stay there until retirement. But Eaton, whose assignments included running a data processsing service center in Guam, saw that businesses were moving computer resources closer to end users and felt the Navy would move in the opposite direction.

"I knew if I stayed, I would be very frustrated," he says.

"In the end, the decision worked out. I've grown a lot here professionally, and I've been challenged and felt satisfied," says Eaton, who reports to Tom Tusher, Levi Strauss's chief operating officer.

Eaton says he is interested in technology for what it can do for business performance rather than as an end in itself. "That kind of thinking is what gets the payback," he says.

When vendors show him products, he tends to think of how the gear can fit systems architectures for his operating units. "When IBM comes to me and tells me they have this, this and this, my first thought is, 'How is that going to help the implementation of our existing architecture?' Or, 'How can it help us to do something that we have wanted to do?' "

Eaton is co-chairman of the year-old Voluntary Industry Communications Standard (VICS) committee, a group of leading retail and manufacturing managers who meet to discuss and formalize communications standards.

"We want to get the relationships between the textile companies and retail companies on a common computer link so that the retailer can give us a purchase order electronically. In turn, the textile companies can get this information to know how much of the raw materials to produce," he explains.

On the road again

Eaton says staying close to end users enables him to refine his MIS strategy, so he is no stranger to traveling. On the average, he's on the road four times a month visiting retailers and trading partners and attending VICS meetings.

During the past two years, he says, he has sought to educate executives regarding the competitive potential of MIS. "One of my goals here has been to help top management understand the importance of systems. I have been working to build partnerships with senior managers of our operating companies to show them the opportunities that we have from deploying technology," he says.

Eaton says he enjoys creating an environment in which people are stimulated intellectually and challenged to do their best and in which they can grow through promotions. "Like I said before, I like to build things, and one of my favorite things is to help build people's careers," he says.

One of his subordinates agrees. "He is very focused on the end product, but at the same time he is very aware of people's concerns," says Gevenie Delsol, Levi Strauss's director of business communications. "He also has a great sense of humor, which is vital in that job."

Gearing up for future

Levi Strauss & Co., aggressive in marketing its jeans and sportswear, is equally competitive in applying computer and communications gear to try to solve business problems.

Operating out of a converted brick winery in San Francisco, Bill Eaton, vice-president of corporate information systems, plans the company's systems strategy.

Thus far, the firm's systems include the following:

- A turnkey computer-aided design and manufacturing system from Computer Design, Inc. in Grand Rapids, Mich., based on Silicon Graphics, Inc. workstations. Installed in December 1986, the workstations let designers see apparel on-screen and add color and fabric texture to the design. Computers linked to a 35mm camera provide photographic output.
- IBM 3084, 3081 and four 4381 mainframes in distribution sites. Using IBM's Professional Office System (Profs) software, the company uses electronic mail extensively. Profs is interfaced with Hewlett-Packard Co.'s HP 3000 electronic mail system in sites outside the U.S.
- Levilink, an electronic service that enables retailers and suppliers to perform purchase order reconciliation and inventory and market analysis.

KATHY CHIN LEONG

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Dr. John McQuillan, President, McQuillan Consulting

This intensive, one-day seminar instructs you on planning issues for integrating packet, circuit, and channel switching; SNA and X.25; and voice and data in a corporate network strategy. You will address the role ISDN will play, as well as enterprise-wide networking and bandwidth-intensive applications. **Level:** Intermediate.

T-2 MULTIVENDOR/MULTIARCHITECTURE LANS: MAKING THEM WORK

Dr. Kenneth Thurber, President, Architecture Technology

Attend this tutorial for a comprehensive overview of today's LAN environments. Discussion will include how to tie diverse and often incompatible network elements together in a manageable, logical way, as well as alternatives to LANs. **Level:** Advanced.

T-3 ISDN: STANDARDS, PRODUCTS AND SERVICES

James G. Herman, Independent Consultant, and **Mary Johnston,** Senior Consultant, Telecommunications Consulting Group at BBN

ISDN is fast approaching. Some say with too little agreement on fundamental standards and applications. Attend this highly focused, intensive session to anticipate the emerging standards, vendor trials, conflicts, successes, products and service offerings that will emerge over the next several years. **Level:** Intermediate.

T-4 MULTIVENDOR NETWORK MANAGEMENT

Jerry McDowell, Vice President, Vanguard Telecommunications Inc.

Enroll in this intensive tutorial for skills in how to manage a network which links multiple carriers and a variety of hardware and software vendors in one corporate network. You will learn how to take control into your own hands and avoid finger pointing, acrimony and poor service. **Level:** Intermediate.

T-5 HOW TO BECOME A BETTER TELECOMMUNICATIONS MANAGER

Gerald P. Ryan, President, Connections Telecommunications Inc.

Today's network manager must not only understand new technologies and standards, but must also play many roles in the company. Attend this instructive tutorial for an entertaining and thought-provoking look at what you need to know to be a successful network manager, plus the tools, processes. and organization that will maximize your efficiency. **Level:** Intermediate.

T-6 THE LATEST LOOK AT NETWORK STANDARDS AND OSI

Richard desJardins, Director of Technology R&D, Computer Technology Associates Inc.

As OSI and the older standards are reaching maturity, numerous new standards are in the works. Attend this intensive session for a look at the new generation of standards — including their purpose, significance, applications, and technical elements. **Level:** Introductory.

T-7 MODELING AND DESIGNING DATA AND INTEGRATED NETWORKS

Dr. Wushow Chou, Professor of Computer Science and Electrical and Computer Engineering, North Carolina State University

Enroll in this tutorial for detailed instructions on how to design integrated networks. You'll learn about combining voice and data on a single architecture to maximize the efficiencies of wideband services, the migration from classical multipoint to distributed systems, plus cost-efficiency issues and other practical considerations. **Level:** Advanced.

T-8 IBM NETVIEW: INDUSTRY WIDE IMPLICATIONS

Atul Kapoor, Vice President, Kaptronix Inc.

This tutorial gives you a thorough and comprehensive introduction to IBM's NetView and NetView/PC — their operation, technical specs, dependencies and functional interactions, plus an analysis of their impact on the industry, significance for users, and practical suggestions for implementation. **Level:** Intermediate.

T-9 OPEN NETWORK ARCHITECTURE: CARRIER/VENDOR/USER IMPLICATIONS

Haines Gaffner, President, LINK Resources Corp.

The FCC has ordered AT&T and the RBOCs to adopt ONA to stimulate competition in enhanced data processing services over public switched networks. Enroll in this tutorial to learn the details of the ruling, its implications for service offerings and an overview of who the players will be. **Level:** Intermediate.

T-10 INTERNATIONAL NETWORKS: SOLVING THE PRACTICAL PROBLEMS

Len Elfenbein, President, Lynx Technologies Inc.

Attend this tutorial if your company is expanding its network outside the U.S. You'll receive immediately useful information on tariffs, rules, how to handle ordering and service delays, the role of the PTTs, how to deal with the lack of consistency from country to country, and many more issues you must confront to succeed. **Level:** Intermediate.

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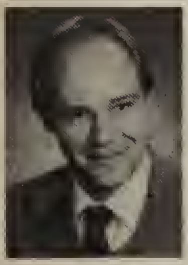
T-11 BUILDING THE NETWORK CONTROL CENTER
Gabe Kasperek, President, Kazcom Inc.



This one-day course will help you successfully operate a network control center on a day-to-day level. You will focus on the practical requirements, functions to be performed, systems and tools available and how to put them all together to gain control over your network. **Level:** Introductory.

T-12 REGULATORY ISSUES AND ANSWERS
Richard E. Wiley, Senior Partner, Wiley, Rein & Fielding

Take this comprehensive seminar to make sense of the increasingly complex regulatory environment. You will receive a thorough briefing on the legal, social, and regulatory issues, the evolution of vendor technology and industry standards, and significant developments affecting the coming regulatory year. **Level:** Intermediate.

T-13 INTRODUCTION TO DATA COMMUNICATIONS
Gary Audin, President, Delphi Inc.

This perennially popular tutorial provides exactly the right mix of concept, technology, and application for the beginner to get a good foundation in data communications. The course notes are excellent reference material and the instructor is one of the most highly regarded professionals in the industry. **Level:** Introductory.

T-14 INTRODUCTION TO VOICE COMMUNICATIONS AND PBX
James Morgan, Principal, J.H. Morgan Consultants

Enroll in this full-day tutorial for a comprehensive foundation in the basics of voice communications — technology, PBX characteristics, switched networks, tariffs and services, as well as an overview of traffic engineering. **Level:** Introductory.

T-15 IMPACT OF THE NEW POST-DIVESTITURE TARIFFS ON LARGE NETWORKS
Robert L. Ellis, President, The Aries Group

In this intensive tutorial you will learn the structure of the post-divestiture tariffs, the latest January 1988 changes to these tariffs, how to price interstate private lines, how to configure and price interstate FX services, the new economics in configuring data networks, the LATA-pure strategy and federal access tariffs and how to use them. **Level:** Intermediate.

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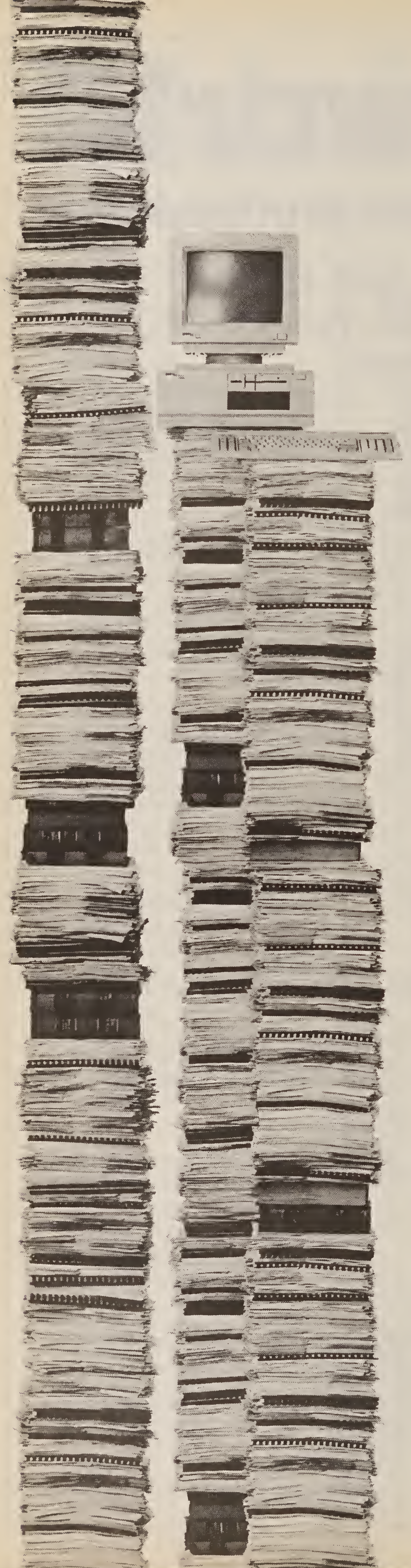

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COMPUTER INDUSTRY

INDUSTRY INSIGHT

Bohdan O. Szuprowicz

Crash leaves a legacy

The great crash of 1987 and continuing stock market instability are having a pronounced impact on high-technology companies, even though their most recent performance results may have been excellent by normal business standards.

During October, the National Association of Securities Dealers Automated Quotations (NASDAQ) system composite index, on which most high-technology stocks are traded, declined by 27%, somewhat more than the 24% drop suffered by the Dow Jones industrial average index of blue chip companies. But the real carnage was among smaller NASDAQ over-the-counter (OTC) stocks, which include many successful high-technology firms that went public during the last few years.

One survey of 250 OTC companies with market capitalization under $90 million revealed that their average prices fell 38% during the period, wiping out all profits since 1983.

Although institutional "cherry picking" among smaller

Continued on page 88

Focus pulls Information Builders to top

BY ALAN ALPER
CW STAFF

NEW YORK — At a time when acquisitions, hype-filled marketing and public stock valuations are playing an increasing role in the mainframe software industry, Information Builders, Inc. is decidedly different.

Information Builders, which expects to top $110 million in revenue this year, is among the largest privately held software companies; only Cincom Systems, Inc. and SAS Institute, Inc. may be larger, by most revenue estimates.

A 12-year-old fourth-generation language and data base management systems vendor, Information Builders has, with little fanfare, grown by an average of 30% annually without any major acquisitions.

Secret formula

The company's formula is to extend the functionality and breadth of Focus, its lone product line and the fourth-generation language market leader, to various operating environments. The vendor has also added mainframe graphics, spreadsheet and report writing capabilities to the core DBMS.

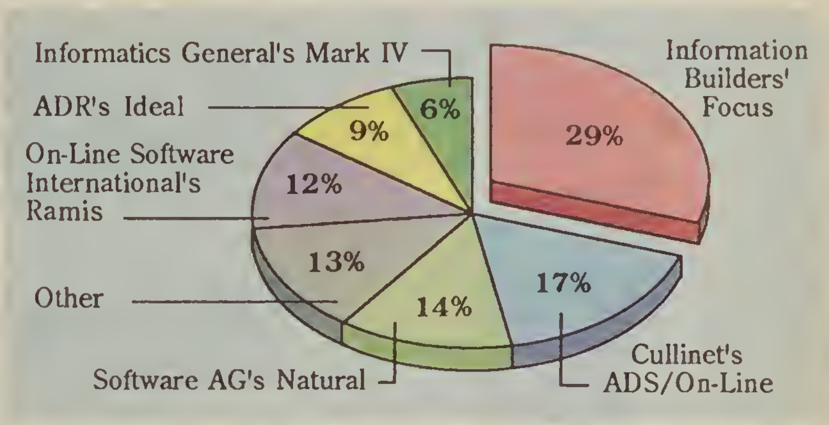
Information Builders ported Focus, originally an IBM mainframe product, to Microsoft Corp.'s MS-DOS and Digital Equipment Corp.'s VMS in 1982 and 1985, respectively — years before those operating systems became hotbeds of software development activity.

It is that type of foresight, analysts say, that has enabled Information Builders to maintain

Continued on page 92

Leading the pack

Estimated use of fourth-generation language products at U.S. IBM and plug-compatible manufacturers' sites, October 1987



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CW CHART

Apple Japan aims to enlist Mac fans

BY LORI VALIGRA
IDG NEWS SERVICE

TOKYO — In a country where the words "personal computer" drum up visions of NEC Corp., Apple Computer Japan, Inc. is promoting the dare-to-be-different approach that has finally won it corporate devotion in the U.S.

That surprises many industry analysts and competitors here, because when Apple began marketing the Apple II in Japan in 1977, it had the PC market to itself. Those analysts said Apple missed its chance to spawn and lead the PC market in Japan as it had done in the U.S.

Apple Japan's problems in the past were numerous. Since 1977, the company has changed its sales network five times, angering some dealers who were underselling each other. And it has had a series of presidents — three in three years. But probably the most crippling handicap was Apple's lack of Japanese software, a problem the company has been remedying during the past year.

"We were essentially trying to sell an ashtray as a computer here," conceded Alexander D. van Eyck, president of Apple Japan for the past two years.

In trying to reestablish itself in a market worth about $5.5 billion, the firm has foregone direct sales in favor of value-added dealers. Net sales have doubled in each of the past two years, and profits increased sevenfold, van Eyck said. But Apple's Japanese market share hovers around 1%, compared with IBM Japan Ltd.'s 7% and NEC's 51%.

Recently, Apple has been looking outside its traditional business and home markets into technical markets. For example, a special interface fitted to the Apple Macintosh enables the computer to act as a measuring instrument for gas exchange experiments. Apple Japan systems houses are also supplying special packages that allow the Macintoshes to access mainframes.

Japanese companies tend to resist computerization more than their U.S. counterparts, van Eyck noted. He cited one company controller who used a Macintosh and Microsoft Corp.'s Excel financial program but still checked the computer's math with an abacus.

Van Eyck said he is counting on Apple's new Hypercard for customer programming and on the firm's vertical market push to help herald a change in the subsidiary's fortunes. "Apple is an alternative technology with a different approach," van Eyck said. "Everyone is moving toward windows and desktop publishing, so our metaphor is justified."

Inside

- 3Com names Bridge VP as general manager of international unit. Page 88.
- IBM plans to double European marketing force by 1989. Page 88.

Industry applauds Reagan's sanctions against Brazil

BY MITCH BETTS
CW STAFF

WASHINGTON, D.C. — The U.S. computer industry applauded the Reagan administration's Nov. 13 decision to impose trade sanctions against Brazil and urged that country to avert a trade war by backing off its protectionist "informatics" policy.

President Reagan said Brazil is engaging in unfair trade practices that prevent U.S. firms from selling to Brazil's hardware and software markets. He specifically cited a Brazilian decision that prevents Microsoft Corp. in Redmond, Wash., from selling its MS-DOS operating system software in Brazil.

The U.S. sanctions were supported by Microsoft as well as by the Computer and Business Equipment Manufacturers Association (CBEMA) and ADAPSO, the computer software and services industry association.

"The White House has clearly given Brazil a month of opportunity to act as a responsible trading partner," because the sanctions are not expected to take effect until the end of the year, said Oliver R. Smoot, acting president of CBEMA.

The U.S. sanctions include a ban on computer imports from Brazil (except intracompany transfers) and the imposition of $105 million worth of tariffs against other Brazilian products [CW, Nov. 16]. A hearing on what products will be hit with new tariffs is scheduled for Dec. 18.

Since 1983, the U.S. government has been fighting Brazil's informatics law, which restricts foreign participation in Brazil's computer market so that Brazilian firms can develop their businesses.

The retaliation was triggered by a September decision of Brazil's Secretariat for Informatics that blocked Microsoft from licensing six Brazilian companies to sell MS-DOS there. The U.S. viewed that action as a violation of a June 30 agreement to loosen some of the trade restrictions.

In the Microsoft case, the Brazilian government claimed that a domestic product was the "functional equivalent" of Microsoft's MS-DOS operating system for microcomputers and, therefore, was adequate for Brazilian users.

But U.S. industry and government officials said the two operating systems are not equivalent. Moreover, they said the ruling establishes a precedent that effectively bans all U.S. companies from the Brazilian software market. The hardware market, except for mainframes, is already closed to U.S. firms.

Pirates ahead

Reagan said Brazil's action also is likely to increase end-user piracy of U.S. software, since it is in high demand but not legally available.

Autodesk, Inc., the Sausalito, Calif.-based vendor of computer-aided design (CAD) software for microcomputers, recently became so frustrated with Brazil's policy that it suspended efforts to penetrate the Brazilian market.

"We've tried to find a way to market our products in Brazil but have met with no success and much frustration," said Chris Record, Autodesk's general counsel. He said the Secretariat for Informatics forbids the distribution of Autodesk software in Brazil.

Furthermore, the Brazilian press has estimated that about 40% of all CAD software used there consists of illegal versions of Autodesk's Autocad product, representing revenue losses of at least $15 million, according to Jim Michler, manager of international sales at Autodesk.

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EXECUTIVE CORNER

3Com Corp. named **Jack A. Bradley**, vice-president of finance and chief financial officer of Bridge Communications, Inc., a senior vice-president of 3Com and general manager of the company's new international division.

The company also confirmed **Christopher B. Paisley** as vice-president of finance and chief financial officer of the merged 3Com/Bridge Communications organization. The merger, ratified by a shareholder vote Sept. 28, made 3Com the surviving company with Bridge Communications a wholly owned subsidiary.

Alloy Computer Products, Inc. announced a major reorganization of its executive staff, including **Richard A. Gorgens** remaining as chairman and chief executive officer and **Joseph R. Saliba** being newly appointed as president and chief operating officer.

Saliba, a 24-year veteran of IBM, where he was one of the team members responsible for introducing IBM Personal Computer products, had been consulting with Alloy in recent months. Prior to joining Alloy, Saliba served as the president and chief operating officer of Lifeline Systems, Inc., a publicly held technology company in Watertown, Mass.

Lester L. Colbert Jr. announced that he will step down as chief executive officer and president of Xidex Corp. but will remain chairman of the board of directors.

Bert Zaccaria, currently executive vice-president and chief operating officer, will be promoted to the positions of president and chief executive officer.

Tallgrass Technologies Corp. announced that **David F. Horton** has joined the corporation as president and chief executive officer. Horton has more than 25 years of high-tech experience. Most recently, he held the position of president and managing partner for Resource Partners, Inc.

His previous positions include president and chief executive officer at Infinet, Inc., vice-president of corporate development for Prime Computer, Inc., and vice-president of product line management at Honeywell Information Systems.

Comtex Scientific Corp. announced the appointment of **Mitchell J. Rapoport** as president and chief executive officer, effective immediately.

Rapoport joins Comtex from the staff of the Chase Manhattan Bank, where he served as vice-president of the electronic banking division, managing the strategic and business development for Spectrum, the bank's electronic consumer financial information and transaction service.

Szuprowicz

CONTINUED FROM PAGE 87

companies has helped to increase the prices of some high-technology stocks since Black Monday, the crash is seen by many to have practically eliminated the opportunity for high-technology ventures to go public.

However, it may not necessarily stem the flow of venture capital for new and follow-on financing.

Initial public offering activity, which depends on the stability of the stock market to price new issues, has virtually disappeared following the crash. Initial public offerings are not expected to pick up until the overall market is considered stable by the leading underwriters that launch new issues and by institutions that are the major initial investors.

Several ventures that were about to go public got caught in the crash, including Relational Technology, vendor of the highly successful Ingres relational data base management systems.

Other firms that had to give up their imminent moves to raise expansion capital in the public markets included SDA Systems, a leading electronic design automation firm; Altera, a maker of application-specific field-programmable logic device semiconductors; and Access Technology, a developer of financial analysis software.

But even here there were exceptions. Although Dell Computer in Austin, Texas, the enormously successful maker of IBM Personal Computer AT-compatible microcomputers under the PC's Limited label, scrapped its plans for a public offering, it raised more than $21 million in a private placement managed by Goldman, Sachs. The company's impressive performance to date apparently counterbalanced any fears investors might have had about the future of this market segment.

Shifting strategies

Professional venture capitalists, on the other hand, are rethinking their traditional investment strategies as a result of the crash. In many cases, OTC market makers were willing to sell stock in high-technology companies even below market prices just to dispose of their often highly leveraged inventories.

As a result, OTC stock prices declined much more than listed shares — and became more attractive to venture capitalists than did the funding of start-up ventures that represent a higher risk.

A related phenomenon may be that venture capitalists with existing investments in high-technology start-ups will spend less time trying to save those companies, many of which will then go into debt or merge with cash-rich competitors. And rapidly growing ventures in the later stages of financing will have to trim their expansion plans. If valuations continue to decline, business failures will increase.

This means that mergers and acquisitions may be the only alternative for smaller companies wanting to expand but unable to finance their expansion from operations or through secondary stock offerings. This is particularly true of software companies that have become extraordinarily attractive takeover targets as stock prices have plunged.

> THE CRASH is seen by many to have practically eliminated the opportunity for high-tech ventures to go public.

A lot of merger and acquisition activity is expected in data base management software, an area in which the trend is to integrate DBMS offerings with SQL-compatible products and business applications. Ashton-Tate, Informix Software and Unify have already been singled out as merger candidates. Aion, a leading IBM mainframe expert systems vendor, could also become a target if its plans to go public in 1988 do not come to pass.

The crash may also affect foreign investment in U.S. high-technology firms. And potentially most damaging of all, the enormous crash-related paper losses in entrepreneurial equity and executive stock options may dampen the desire of creative inventors to leave the safe harbor of larger corporations for new ventures at the leading edge of high technology.

Szuprowicz is president of 21st Century Research in North Bergen, N.J., and publisher of "Supergrowth Technology USA."

IBM plotting big European push

BY AMIEL KORNEL
IDG NEWS SERVICE

GENEVA — Seeking to reverse a slowdown in European revenue growth, IBM plans to beef up its European marketing force to a field army of some 40,000 by the end of 1989, an increase from roughly 20,000 at the start of last year.

"We are driving to double our sales force in Europe by the end of 1989," said C. Michael Armstrong, president director general of IBM Europe. Armstrong said the company is aiming to increase the number of personnel hawking and supporting IBM gear in Europe to some 24,000 by the end of the year, a 20% increase from the start of 1986.

According to one source, about one-third of the new marketing personnel will be sales representatives while the remaining two-thirds will be systems engineers for customer support. IBM refused to give a breakdown of the figures by job category or country.

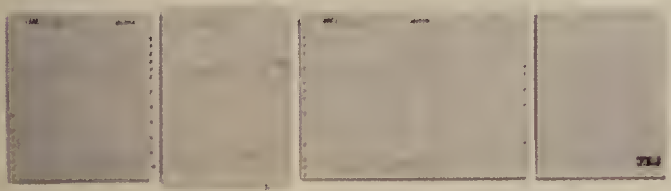
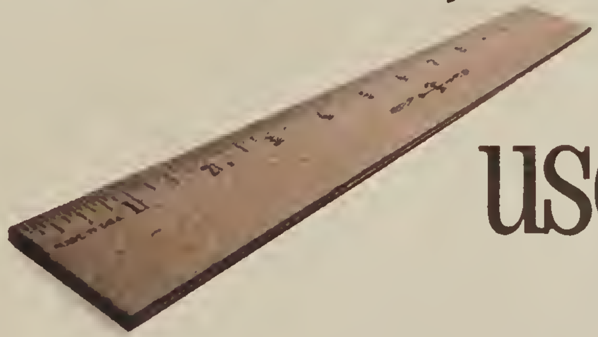
Armstrong indicated that the extra marketing muscle is critical to improving the performance of IBM affiliates in Europe, citing West Germany as an example of where this is specifically true. IBM West Germany posted a 9% revenue decline in 1986 to $7.1 billion.

IBM users in West Germany said they have begun to detect a change since IBM Europe's reorganization.

"We've noticed that IBM tends to support us more," said Ton Tilburgs, president of the West German branch of Common Europe, an organization of IBM midrange system users. Tilburgs cautioned that it is too early to feel the full effect of the marketing push.

"IBM is a very large company," he said. "It's like a train. It starts moving quite slowly, but when it gets going, it goes." He added that IBM seems to be specifically targeting mid-range users.

Worldwide, IBM last year registered a revenue rise of only 2.4% to $51.2 billion. In the second and third largest European markets after West Germany, French revenue declined 2.5% to $6.3 billion while UK sales edged up only 1.3% to $5.5 billion.

If we said our printer did 90 pages a minute, used fanfold paper, printed  electronic forms, didn't take up much space,  used a new non-impact technology, was extremely reliable, and didn't cost a fortune,

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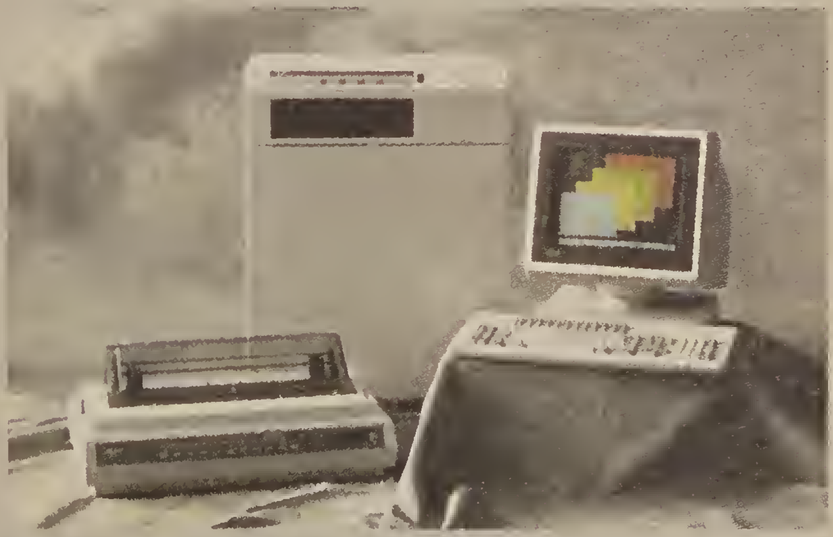

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Focus

CONTINUED FROM PAGE 87

its market lead even though other fourth-generation language and DBMS products may be more technologically advanced or easier to use.

Keeping a low profile

Interestingly, most data processing professionals know Information Builders as Focus. The understated corporate identity reflects Information Builders' low-key marketing approach, and it does not bother company executives.

"Besides, it's too late now to change our name to Focus," quips Gerald Cohen, Information Builders' president. "I've been at functions where I tell people, 'I'm with Information Builders,' and they say, 'Who?' It's something we've become accustomed to, though."

Cohen, an orginal developer of fourth-generation language technology while he worked at Mathematica, Inc., cofounded Information Builders in 1975.

Mathematica was the progenitor of the competing Ramis, a fourth-generation language now owned by On-Line Software International, Inc., which is headquartered across the Hudson River from Information Builders' Manhattan offices.

Anonymity hasn't hurt

Although it lacks a strong corporate identity, Information Builders has established its product as the leading fourth-generation language and DBMS in the marketplace.

Focus is used at 29% of the IBM and plug-compatible mainframe sites in the U.S., according to Focus Research Systems, Inc., an independent West Hartford, Conn., market researcher unrelated to the Information Builders product.

Focus outpaces ADS/On-Line from Cullinet Software, Inc. with 17% usage and Natural from Software AG with 14%. Furthermore, Information Builders claims that about 65% of all information centers use Focus.

Re-created in own image

"They've managed to restructure the information center in their own image with Focus," says Peter Burris, a software analyst with International Data Corp. (IDC) in Framingham, Mass. "Either programmers use Focus, or they use something else."

Focus was developed in the mid-1970s as a mainframe-oriented product that could be accessed remotely via time-sharing systems. When time-sharing fell out of favor, Focus ended up residing on IBM 4300s.

From there, it was ported to IBM Personal Computers, DEC VAXs, Wang Laboratories, Inc. VS and Unix.

Caught the wave

Porting Focus to the VAX environment has paid off handsomely, Information Builders' Cohen says. The company was among the first members of DEC's Cooperative Marketing Program and counts that firm as its largest user of Focus for the VAX. "We were like the surfer who caught the wave as it was going up and rode it in," Cohen says.

Although Information Builders has purchased some technology, its acquisition last summer of small expert systems developer Level Five Research, Inc. marked its first corporate buy-out.

"I T'S TOO LATE NOW to change our name to Focus. I've been at functions where I tell people, 'I'm with Information Builders,' and they say, 'Who?' It's something we've become accustomed to, though."

GERALD COHEN
INFORMATION BUILDERS, INC.

Level Five fits well with Information Builders' strategy because its products enable users to do things like problem analysis and intelligent documentation, which Focus does not do, according to Cohen.

Beyond technology, Cohen says, service and support are key ingredients in Information Builders' leadership of the fourth-generation language and DBMS market. Besides traditional hot-line support, the firm offers training at 20 offices around the country and has 125 employees whose function is to help customers get applications running.

Information Builders' service and support set it apart from competitors, IDC's Burris suggests. "Today, many companies think what they're selling is code or product," Burris notes. "Information Builders is one company that recognized that they're not selling product but selling service. It's a way of doing business for the information center."

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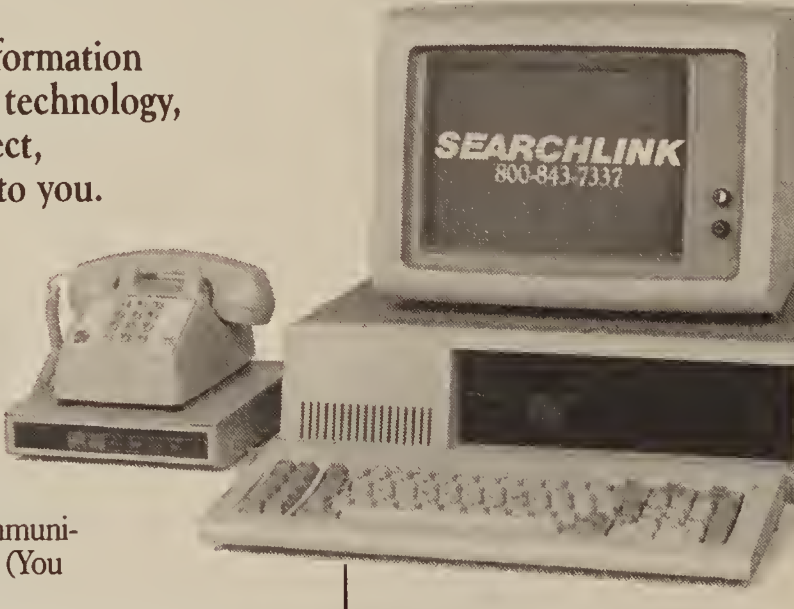

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   - 38. Data Comm. Network/Systems Mgt.

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   - 41. Engineering, Scientific, R&D, Tech. Mgt.
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In large systems, protection means placing guards at every point of vulnerability and pretesting for battle readiness

MOUNTING A SOLID DEFENSE

BY KENNETH G. BRILL

ALAN D. HOPKINS

It's a classic "can't live with, can't live without" conundrum. Computers can't function without electrical power, but even with it, they still may not function properly. Computer equipment vendors disclaim responsibility for power bugs and glitches; utilities companies typically are not even aware of the problem. But large, new computer applications all assume uninterrupted computer operation, and a random glitch or surge can idle hundreds of people and halt basic operations, with every minute of downtime costing thousands of dollars.

To minimize the impact of poor power, many organizations consider uninterruptible power supplies (UPS), which, for a large site, can cost hundreds of thousands of dollars. Although these companies expect this equipment to be *the* answer to preventing expensive downtime, the problem is not nearly that easy to solve. A UPS addresses just one aspect of the complex and interrelated electrical infrastructure required to deliver clean and continuous power.

In fact, the crux of power protection for large systems is not really equipment. Rather, it is the vision and planning required to see how all the pieces fit and to spot and neutralize vulnerabilities. The burden of guarding the electrical power supply and preventing interruptions falls squarely on MIS. Although an MIS manager may not be an engineer, he must screen the professionals he relies on for their grasp of the unique reliability requirements of computer power.

According to Jack Owens, executive vice-president and director of electronic data processing services at Shearson Lehman Brothers, Inc., an American Express Co. subsidiary, the hardest part of creating a fail-safe power system is dealing with engineers who do not believe it is worth planning for certain equipment to fail. Owens, who oversaw the design and construction of Shearson's $200 million, 200,000-sq-ft data center, says, "In my experience, the failures that cause or threaten the most serious disruption are usually those things that are never supposed to fail — transformers, bus ducts, switch gear and so on."

It is a serious mistake, Owens says, to assume your site is safe just because you spent a lot of money on power-conditioning systems and emergency generators. "Our observation over the years has been that 30% to 40% of this equipment doesn't work," he says.

That estimate is readily confirmed by other users who have been through the power wringer. Ed Earle, vice-president of data processing at American Express Travel-Related Services Co., remembers more than one brush with the unthinkable. "We'd invested millions in uninterruptible power supply systems, turbine generators and every kind of protection device imaginable," he says. "Yet, over a six-week period, our on-line systems went down twice for UPS failure and once for air-conditioning. This was never supposed to happen."

And for Marvin Boleski, director of computer services at Blue Cross/Blue Shield of Kansas, installing a UPS was an exercise in humiliation. After living for years with power problems, Boleski

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Brill is a consultant specializing in uninterruptible power supply systems and site uptime management. He is president of Computersite Engineering in Cambridge, Mass.

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finally, in 1985, convinced upper management to invest $350,000 in a UPS with the promise that it would virtually eliminate power-related downtime. Installation of the UPS at Boleski's site, an IBM 3080 shop, won approval.

Construction responsibility was assigned to the company's building department, which chose to use a local architect, engineers and subcontractors. The 500-kVA UPS went on-line with no burn-in or testing because, according to Boleski, the engineers said, "Just turn it on, and it will work."

During the next nine months, however, Boleski's organization experienced more downtime than it ever had without the UPS. "I was embarrassed, and my credibility was at stake," he recalls. "We kept doing what the UPS manufacturer said, but things didn't get any better." Eventually, Boleski retained a consultant, who traced the problem to faulty grounding in the electrical distribution system, a preexisting problem that installation of the UPS had exacerbated.

Two's not enough

Not even two UPS systems necessarily constitute adequate protection, as Sony Corp. of America in Park Ridge, N.J., recently discovered. According to Al Almerini, MIS facilities manager, Sony fell prey to problems between the emergency generator and the UPS, which forced the company to run its computer systems on the generator for two days.

"The generator's frequency was outside the UPS's input window," Almerini says, "so the UPS locked up. When power came back, we couldn't transfer and had to stay on the generator until we could take the computer down. I'm still trying to unravel whether there is a real frequency problem or whether something is just out of adjustment."

> THE AWFUL truth is that power problems are almost always elusive. Any and all potential threats must be considered, and the concept of a cure-all piece of equipment must be jettisoned.

The awful truth is that power problems are almost always elusive. That is why, if the goal is uninterrupted computer operation, any and all potential threats must be considered, and the concept of a cure-all piece of equipment must be jettisoned.

What MIS users mean by a UPS is not what vendors offer for sale. Users want a total package that will deliver an uptime result. What vendors offer is very sophisticated equipment that governs one specific aspect of power protection.

"UPS" to vendors does not mean the entire uninterruptible power system but just the UPS. While a critical component, the UPS is only one of at least 11 subsystems required to electrically ensure uninterrupted operation. These subsystems bring power into a building, condition that power and distribute it. A failure anywhere in this sequential network can cause catastrophic computer downtime.

Having an excellent power conditioner does no good at all if the wiring in the computer room is faulty. Every subsystem must be designed, manufactured, installed, tested and maintained to the same exacting standards or else the weakest link will end up dictating the end result.

MIS users are responsible for matching each subsystem's characteristics with those of the other components of the uninterruptible power system. Systems engineering is a discipline virtually unknown in building and computer site construction. For that reason, carefully selecting engineers is critical.

With all caution

When planning the power protection for Shearson's data center, Owens used not one but two engineering firms to challenge traditional assumptions and spark creativity. "We ended up hiring two firms because we wanted design as well as hands-on operating experience," Owens explains. "I wanted a method of professionally challenging ideas, and that was difficult to do with only one company."

Kling Lindquist in Philadelphia, a local engineering firm, played the traditional engineer's role of providing detailed drawings and specifications for the data center facility. In addition, the firm supervised the risk analysis and reliability plan.

Shearson tapped the second firm, Dixon & Associates in Mission Viejo, Calif., as a consulting resource because of its reputation for knowing how to get the most out of UPS equipment. Even though the site has been on-line for more than a year, both firms are in continued contact with Shearson on operating problems.

According to Chip Ralston, principal of Kling Lindquist, the downtime risk analysis and resulting reliability plan are key elements in designing any large uninterruptible power system.

"At Shearson, the review process took two days," Ralston says. "In attendance were Shearson's project management group, the DP group, a representative from the construction contractor, the [Dixon] UPS consultants and our design team. Before committing money to our design, we were looking for events that could cause failure of the entire facility. We wanted to determine how the risk of single-point failure modes could be reduced or eliminated."

Shearson's goal was a cushion of self-sufficiency that would allow it to operate independently of all utilities and the outside world for a minimum of 48 hours.

"We played out on paper how we would react to every emergency we could think of," says Dennis Cronin, Shearson's vice-president of facilities engineering. "When we found a piece of equipment that could knock us down, we analyzed how long we might be kept down for repairs. If we determined that we couldn't restore uptime within minutes, we designed in redundancy."

From this risk-analysis process came

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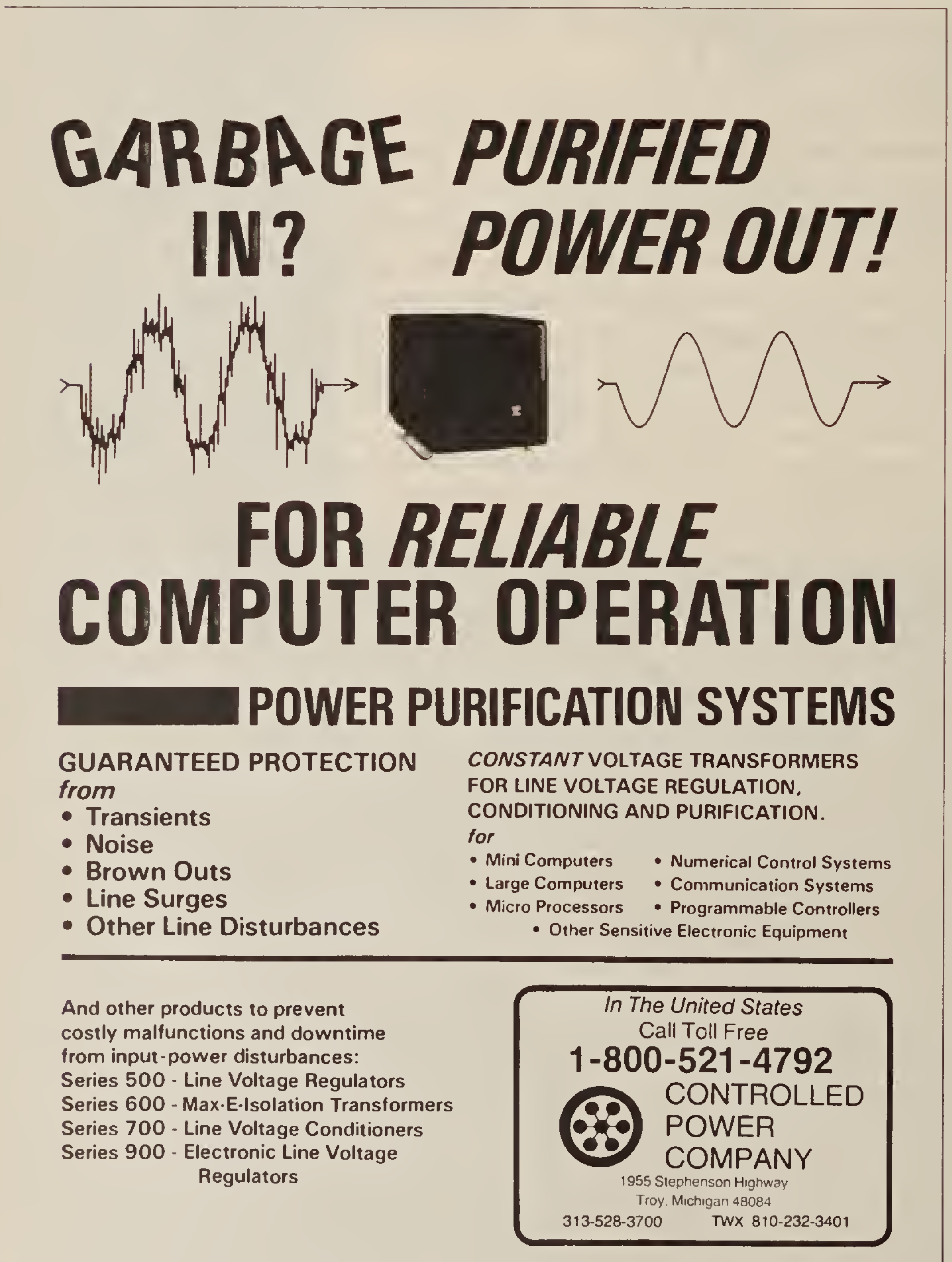
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If climate prevails

BY MEL MANDELL

Geography plays a large role in determining the criticality of backup power for smaller systems. Protection is virtually mandatory in Florida, where Tampa and Orlando vie for the title of "Lightning Capital of the World."

At the operations center of Manufacturers Hanover Corp. in New York, only 1% of the micros — those dedicated to production — receive backup power. A simple approach is taken, according to Arthur Bloc, vice-president at the firm.

Backup power from the large uninterruptible power supply (UPS) for the mainframes is brought to a few special power outlets on two floors of the 22-story building in downtown Manhattan. What if an executive on an upper level wants backup power for his micro? "I would most likely install a small, stand-alone UPS for him," Bloc says, "because of the staggering cost of retrofiting power cables in New York."

It's up to you

The same approach is taken on the trading floor of Citibank NA in New York, where billions of dollars in bonds, notes and currency are traded each day. The newer portion of the floor has special power outlets fed by the UPS that backs up the building's mainframes. The decision to plug into one of these outlets is left to individual traders, explains Roger Bender, a microcomputer manager with Citibank, the nation's largest bank.

In central Florida, outages lasting an hour or more are common from May through September. To cope with the longest outages often takes more than a UPS, even those with 15 to 20 minutes of battery backup. That's why Harcourt Brace Jovanovich, Inc., the giant media conglomerate, installed two motor generators in its headquarters in Orlando to take over for the organization's two UPSs when an outage lasts more than two or three minutes.

The generators kick in three or four times a week during the summer, according to Michael W. Byrnes, director of computer operations.

A difference of seconds

Atlanta, like many cities in the country, is plagued by weekly outages. Most last only a few seconds, but this is enough time to create substantial problems.

"It is enough to bring a System/38 to its knees," says Bill Donnelly, DP manager at Delta International, a direct marketer of household items with annual sales of $30 million in Roswell, Ga.

To help overcome his boss's reluctance to lay out $18,000 for a UPS, Donnelly proposed that the private branch exchange, facsimile machine, word processing system and dial-in dictation machine all be tied to a 10-kVA UPS.

Supplying backup power is very much a dollars-and-cents decision. You must know what your power needs are — and decide if protection is worth the cost. ●

Mandell is a free-lance technical writer based in the Bronx, N.Y.

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changes to the electrical design and a better understanding for all participants — particularly for the DP department — of how the new center would work. "We emerged from the two days with a total atmosphere of quality control. We had become a team; we were committed to make it all work," Ralston says.

See how it runs

Shearson's next big managerial checkpoint was a test run of the entire site. With the computers still at the old site, the company brought in electrical load banks to simulate normal operating conditions, with the objective of testing both capacity and component compatibility. Shearson used the testing process as an internal training experience so that its maintenance people would be familiar with the equipment when the contractors turned it over to them.

Pretesting the total system is not standard procedure, but it should be, Ray Dixon of Dixon & Associates says. "What you get when you buy from manufacturers are pieces," he explains. "Individually, the pieces are tested by their manufacturers, but ordinarily, nobody tests the system in its entirety. What Shearson did was unusual, but everyone should follow their example."

According to Dixon, Shearson's dry run uncovered several construction errors, including complete conduit runs with 147 wires left out. Such problems are not uncommon in any complex construction, he says.

The only exceptional aspect of the situation was the fact that Shearson caught the problems before they did any damage. "The money we spent and the corrective action items we found were minor, relative to the cost of a single failure had the mistakes not been caught during the test," Dixon says.

Building blocks

While the size of its data center makes the Shearson example unique, the management principles Owens employed are not. Any data center with an IBM 3090-class mainframe typically invests in more than a million dollars worth of UPS and related uptime equipment. The operating cost of this investment — including utility bills, service contracts and staff — can add up to $500,000 or more a year. With numbers as big as these, power system performance constitutes a major corporate asset that should be managed with acute attention to detail and careful testing.

The 11 building blocks of a complete uninterrruptible power system are as follows:

- Utility service entry, high-voltage step-down transformers and building switch gear.
- Lightning protection.
- Critical power buses.
- UPS.
- UPS air-conditioning.
- Frequency converter.
- Batteries for UPS.
- Emergency generators.
- Emergency readiness testing.
- Computer room power distribution.
- Grounding.

Utility service entry, step-down transformers and building switch gear. The electrical equipment that accepts the utility power, steps it down to the building's distribution voltage and controls its flow is expensive and can easily take weeks or months to repair. If this equipment is damaged, not just the computers but the whole building may be put out of commission.

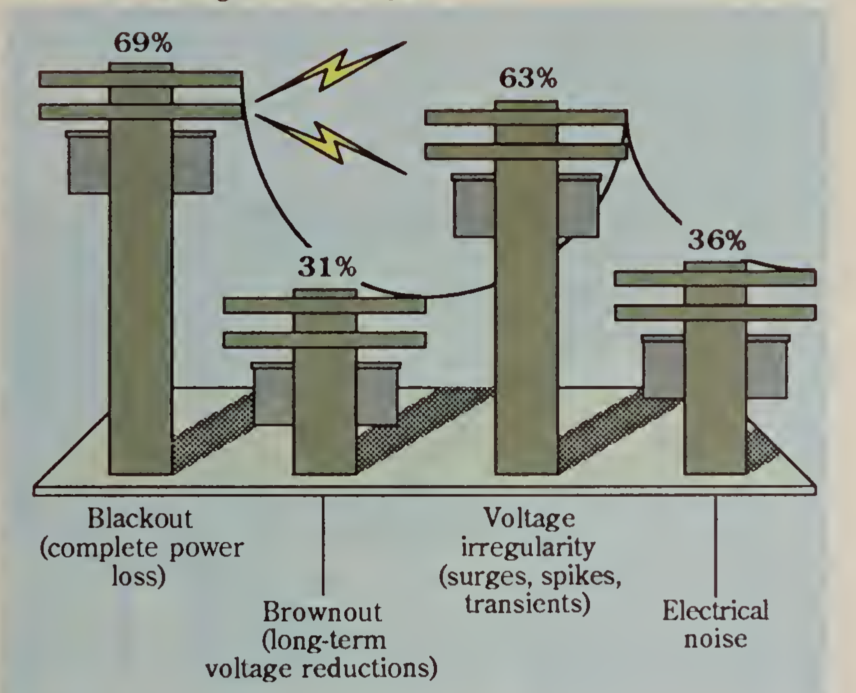
In heavy manufacturing plants, part of the job of facility engineers is to maintain contact with the outside electrical utility and to prevent malfunctions of this equipment. But most computers are located in office buildings that do not justify keeping a power engineer on staff.

Catastrophic malfunctions of utility transformers, service equipment and building switch gear can be virtually eliminated with regular preventive maintenance, provided MIS managers allow this to be done.

Good engineering practice would require shutting off all building power for a 10- to 20-hour period at least once a year to physically check the tightness of all high-voltage and building switch gear connections, test the trip settings on all major power circuit breakers and high-pot-test transformers and samples of transformer oil for signs of insulation deterioration.

Common power disturbances

Ranked by percentages of organizations reporting one or more occurrences during a 12-month period



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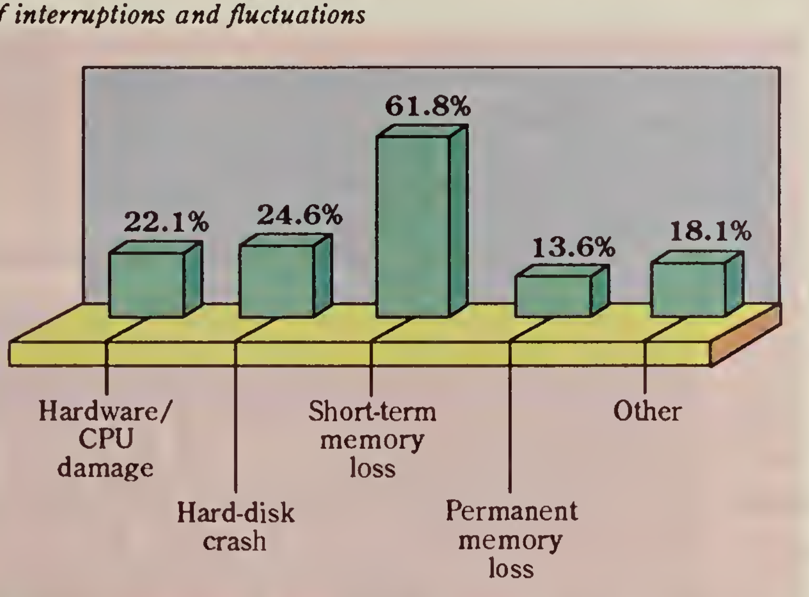
Since a total shutdown is often unacceptable, thermal imaging can be used to detect hot spots caused by loose electrical connections. The advantage of thermal inspection is that it does not require shutting off building power. However, it is not as good as a physical inspection and should not be used as a substitute for more than three years.

Effects of power disturbances

Types of operational problems experienced as a result of interruptions and fluctuations



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Banking is one industry for which maintenance shutdowns can present real difficulties: Shutting off power means not being able to service remote automated teller machines. Connecticut National Bank in Hartford, Conn., is no exception.

Despite any hardships that may occur, Bill Helmsteter, manager of DP hardware and facilities, shuts down his operations for a four-hour physical inspection once a year, because, he says, he cannot take the risk of failure in either the building's primary or secondary switch gear. "I couldn't consider not shutting down," Helmsteter says. "In seconds, an electrical fire could destroy parts that could take months to replace. By accepting a planned four-hour outage, I can virtually eliminate the chance of a disaster that could put us down for days."

Connecticut National performs semiannual thermal inspections. According to Helmsteter, every inspection turns up something that needs attention. "Most times," he says, "we can wait until our annual shutdown. But about once every other year, we find something so serious that we can't wait."

Lightning protection. The best protection from lightning is to dissipate its energy before it can enter the building. Depending on the location, this means that, as a minimum, the utility must install air-gap lightning arresters on each power phase at the point of service entry.

Contrary to popular belief, bringing power underground does not eliminate the threat of lightning. When lightning strikes a utility line, at least two things can happen.

First, one or more power phases will usually arc over to the structure, creating a momentary voltage drop that users can experience from hundreds of miles away.

A second threat comes from high-energy transients coupled into power lines by even a close lightning strike. The destructive energy of these transients decays very rapidly with distance. High-energy transients can also find their way into telephone lines and data communications cables, providing almost a direct path into the heart of the computer with virtually no filtering as protection.

If the roof or equipment on the roof is higher than the surrounding terrain, a grid of heavy copper wires may be needed to envelope the building. The purpose of this grid is to collect and channel lightning energy away from the building by providing it with a better path into the ground.

Critical power buses. A major data center with a UPS and a generator set will have three power buses: the critical power bus, the raw power bus and the interruptible power bus.

As its name implies, the critical power bus is the one on which both conditioned and uninterrupted power must be maintained at all times. Loads connected to the uninterrupted power bus typically include the computer and its peripherals, telephone switches and communications equipment and some site equipment, such as chilled-water circulators, blowers and transfer pumps.

The raw power bus distributes raw power exactly as it is received from the power company. This bus serves computer operations and the rest of the building.

The interruptible power bus feeds site equipment that will not affect computer operation if turned off for 10 seconds to several minutes. Typically, the major interruptible loads are computer room air-conditioning and mainframe chilled water, either of which can usually be shut down for several minutes without a problem.

The interruptible power bus normally receives raw power from the utility. In the event of raw bus power failure, emergency generators automatically start and, within 10 seconds to a minute, replace the utility in supplying the interruptible load.

Each of these buses should receive the same kind of annual preventive maintenance as does the building switch gear. In addition, the electrical load on each major circuit breaker should be measured to ensure it is less than 80% to prevent unnecessary trips because of unknown overloading.

Uninterruptible power supply. The UPS conditions the energy it receives and upgrades it to the computer's standards for both power quality and continuity. If no power is available from the raw power bus or the interruptible power bus, the UPS makes up what is missing with energy from batteries.

Currently, there are three types of UPSs available: static, rotary and hybrid static/rotary. Each has advantages and disadvantages; rotary units generally are more rugged and expensive.

No matter what the technology, every UPS must perform three electrical functions. The first is to convert incoming power to either DC or rotational momentum. The second is to reconvert this energy back into computer-grade power. The final step is to charge the battery to maintain it in a state of readiness.

Although static systems dominate most of the market, rotary systems are hardly as old-fashioned as many people assume. Virtually every rotary manufacturer uses state-of-the-art technology to improve performance and efficiency and reduce floor space requirements.

What separates rotary from static systems is how computer-grade power is recreated. Static systems use either transistors or silicon-controlled rectifiers to statically — that is, with no moving parts — act as a switch, turning DC power on and off from either the input or battery. To develop enough power capacity, many transistors or several silicon-controlled rectifiers must operate in parallel.

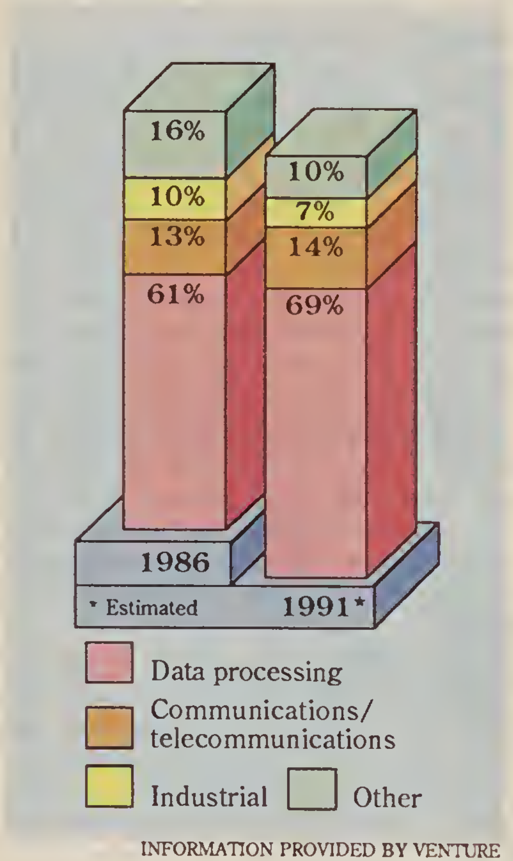
Rotary vs. static

Rotary units will always best static units on the reconversion step because their output power contains more input-to-output isolation and lower source impedance than static units ever will. Rotary units also store energy in their spinning motor and generator, providing momentary power-interruption continuity even if the battery does not work.

UPSs can operate in redundant configurations to increase capacity and reliability by running two or more modules in parallel. For example, 200 kVA from each of three 500-kVA modules can supply a 600-kVA load. If one module fails and is switched off in time, the load will automatically swing to the remaining two, each of which will supply 300 kVA.

Expenditures for off-line UPS systems

Percent of sales of uninterruptible power supply systems by purchasing business segment, 1986 and 1991



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A couple of things must be considered when planning for redundancy. One, getting a failed module off-line without dragging the others is easier said than done. Also, partial load efficiency — when the unit is working at less than capacity — is important in redundant configurations because the load on each module can be as low as 15% to 25%. (Nobody runs their machines full out.)

Opinions vary as to the extent of protection that redundancy actually buys. A large bank in Ottawa, Ont., uses six 150-kVA modules to provide a total of 750 kVA of redundant critical bus capacity. Using three 300-kVA modules would have been less expensive, but the bank decided that using more, smaller models would increase its flexibility. After two years of on-line operating experience, the redundant configuration has saved the critical bus from repeated failures by one particular module.

Connecticut National Bank, on the other hand, decided against parallel systems. "We decided to go with one 500-kVA rotary system," Helmsteter says. "We have since added a 300-kVA and a second 500-kVA [system, but not in parallel]. Each unit supports a different operation, so if one fails, we don't lose everything.

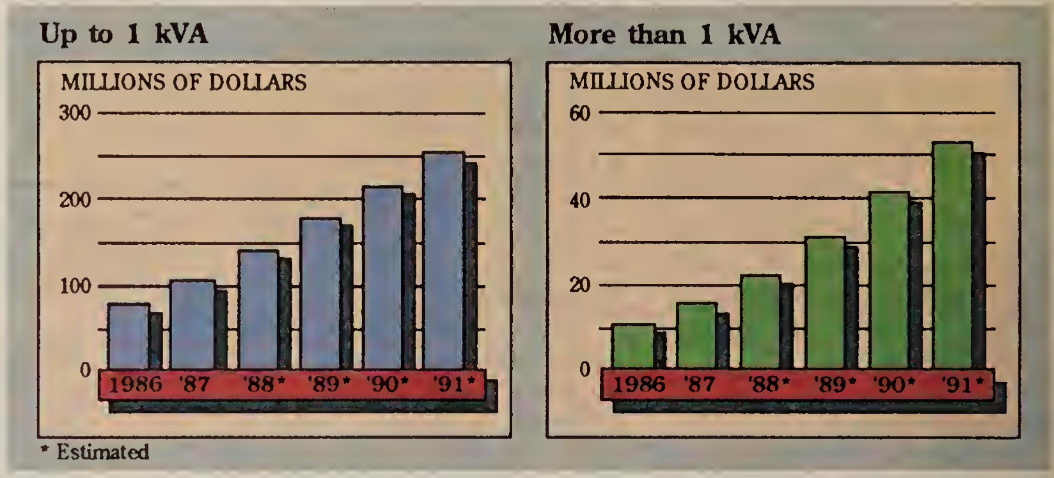
Is it reliable?

Reliability is a very tricky area, and the customer ought to beware, because things are not always what they seem.

A prime example of the illusions to

Sales trends in off-line UPS systems

Dollar value of shipments by power rating, 1986 to 1991



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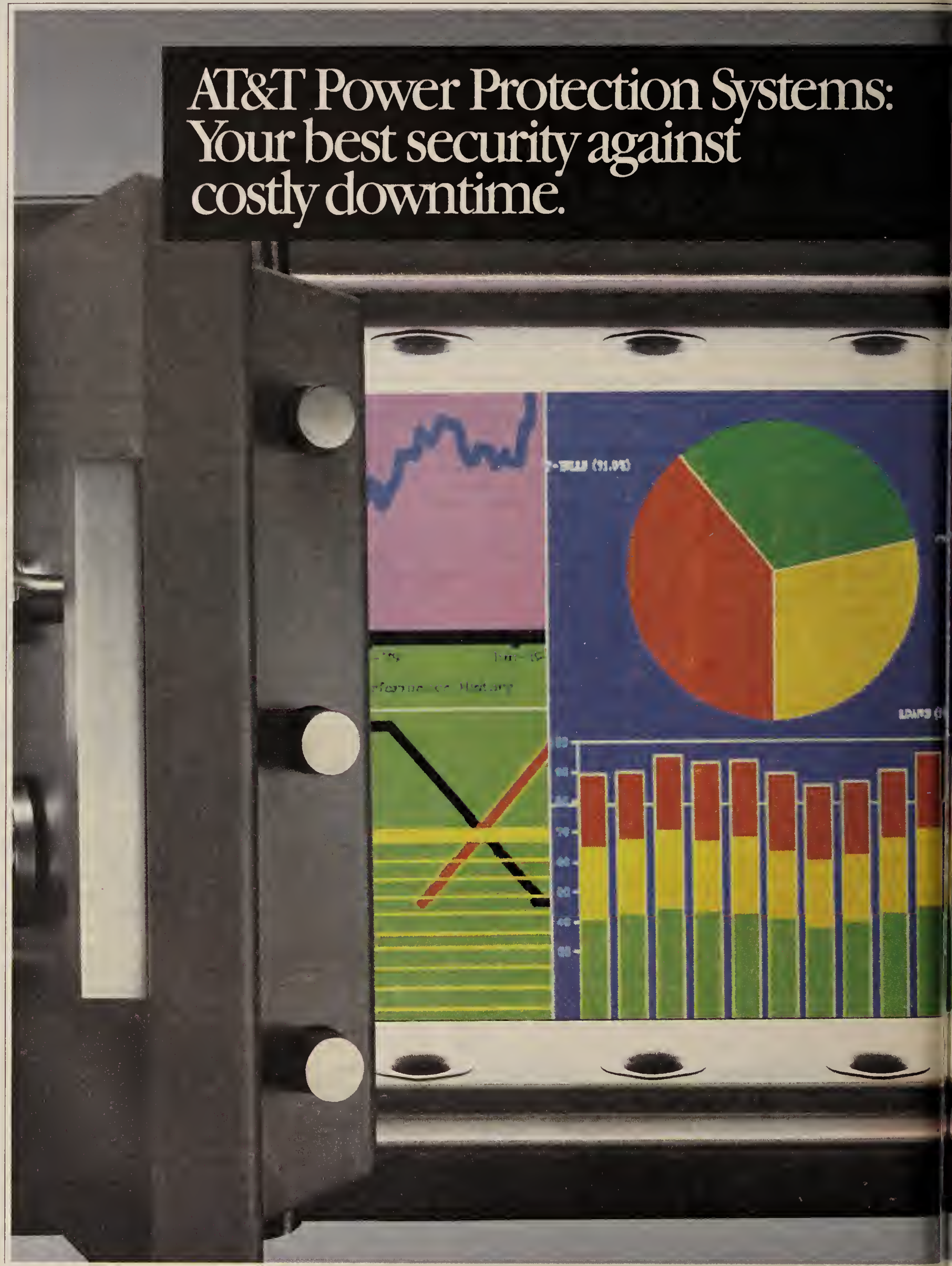


which purchasers may fall prey is the term "mean time between failures" (MTBF), a phrase thrown around to compare different manufacturers and technologies. The idea is that the longer the time between failures, the more reliable the equipment.

For comparison purposes, this is true only if you can get actual data from existing installations. For competitive reasons, manufacturers are reluctant to supply reasonable MTBF data because a competitor can arbitrarily supply better numbers by using a different calculation.

One way of cheating

The most common method of predicting MBTF involves component derating. Several assumptions are made that can substantially affect the results. It is relatively easy to tinker with the assumptions to produce any result desired.

For example, a common assumption is that the failure of an inverter does not affect the operability of the static bypass. Furthermore, at the moment the inverter fails, clean computer-grade power is available from the utility to supply the computer directly via operation of the static bypass. This logic defies the whole purpose for installing a UPS.

What is more likely is that the same power problem that affected the inverter will also harm the bypass, resulting in a hard crash to the supposedly protected load. Or, if the static bypass does work, the power problem that has already damaged the inverter will be directly connected to the critical load, where it can cause further damage.

From the start, projecting MTBF from component derating is faulty because the raw data assumes a failure rate using "normal" power. But UPSs are installed to clean up and protect computers from known dirty power. Why spend money if this is not true? If dirty power is a known or likely input, component failure rates using normal power are invalid.

UPS air-conditioning. Virtually all static UPSs are themselves computers that require air-conditioning to function most reliably. If cooling fails, most static units will shut themselves down because of overheating. They will then bypass the critical bus to the interruptible bus, allowing a direct path for raw utility power to reach the critical load. To prevent this, redundant cooling systems should be used so that a slipping blower belt in one does not result in a UPS malfunction.

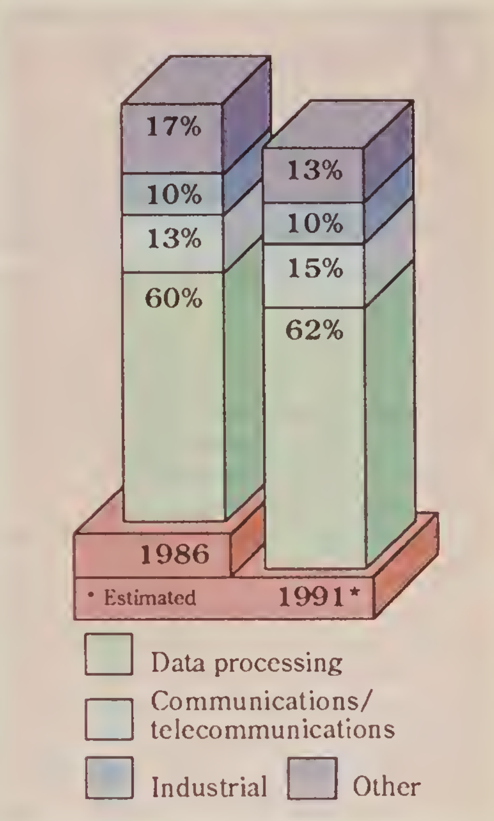
Frequency converter. Virtually all large mainframes require 415Hz of power. Since the frequency supplied by the utility is 60Hz, a frequency converter is required. Often, multiple frequency converters are connected to a redundant output bus so that if one fails, the others can continue supplying the load.

Frequency converters can be static or rotary. Of the two technologies, rotary converters, also known as motor generators, have a much lower source impedance, a feature proven to be an important advantage in powering the increasingly nonlinear 415Hz loads created by the latest generation of IBM 3090 mainframes.

Because energy travels on the outer surface of the conductors — resulting in large voltage drops if the power has to travel far — 415Hz of power is, electrically speaking, unusual. For this reason, frequency converters are typically located in the computer room immediately adjacent to the mainframe or mainframes they power. If the 415Hz bus is located more than 100 feet from the computer, line-drop compensators may be required.

Expenditures for on-line UPS systems

Percent of sales of uninterruptible power supply systems by purchasing business segment, 1986 and 1991



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While uninterruptible power systems must possess some type of converter, having one of each can help users prove to finger-pointing field engineers and vendors that power is not the problem.

"Originally, we used motor generators to produce 415Hz for our mainframes," says Bill Rustico, executive vice-president of MIS at Connecticut Bank & Trust Co. in Hartford. "As an efficiency move, we subsequently purchased a solid-state frequency converter that uses the same battery string as our 1,200-kVA 60Hz UPS. But we have kept our motor generators and have them wired so we can run them off the 60Hz UPS if the static converter fails, a problem that has happened several times.

"Having both power sources has been

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invaluable in facing down field-service engineers who try to pin internal computer malfunctions on poor power," Rustico adds. "When we think this is happening, we start up the rotary converters and demonstrate that the internal malfunctions continue independently of where the power is coming from."

Batteries. If either raw utility power or emergency generator power on the interruptible power bus fails, the UPS takes energy from batteries and converts it, without interruption, into the power the computer requires.

Battery capacity is typically expressed in terms of the number of minutes the critical load must be maintained. Between 10 and 15 minutes is the typical crossover point at which, even with acceptable power, computer hardware gets too hot without a cooling system. Beyond 15 minutes, air-conditioning must be restored.

One consideration in selecting battery capacity is operating conditions; these may vary from site to site. Several operating decisions must be made when one knows the critical bus is so many minutes away from crashing: How long does it take to bring the computer to a graceful halt with no loss of data? If the generator does not start automatically, should one allow time for trying to get it started manually?

> TO BE ready for any emergency, the generator should be tested regularly with at least a half, but preferably a full, load.

In most cases, power will return in less than five minutes, so the generator may not be needed. However, if power is still off at the end of seven or eight minutes, it is probably going to be off longer than 15 minutes. When the initial critical load turns out to be substantially less than design assumptions — something that often happens during the early years of operation — actual run-down time for the batteries can double from 15 to 30 minutes.

Recharging the batteries after a discharge is another factor separating UPS technologies. Most battery manufacturers limit the battery recharge rate to three times the discharge rate; the recharge rate of many UPSs is 10 times or more the rate of discharge. This is an important factor to evaluate, because full power protection is not restored until the batteries are fully recharged. The tighter this window, the less exposure the critical load has to risk.

In a substantial study on reliability, Puget Sound Power & Light Co. tested 101 battery systems. The study revealed that only 57% of the systems were acceptable, 39% failed outright, and 4% were marginal. These findings will come as no surprise to UPS service representatives because, after inverter or static bypass power circuit malfunctions, battery subsystem failure is the next most common failure mode of uninterruptible power systems.

Batteries come in two basic configurations: wet and dry. To ensure reliable operation, every battery must be physically inspected and load-tested on a periodic basis.

Dry batteries offer several advantages. They are physically smaller than wet cells, and they do not emit hydrogen gas. Therefore, they can be housed inside the computer room without special ventilation. However, dry cells have a much shorter life than wet cells and must be replaced every three to five years.

Wet cells, an older technology, typically last 10 to 20 years. Either type must be located in a temperature-controlled space.

Emergency generators. When utility power on the raw bus fails, the emergency generator is supposed to start and supply power to the load on the interruptible power bus. Vital engine components, such as the batteries, water in the cooling jacket, lubricating oil and even the fuel, are kept warm by heater jackets to facilitate starting in cold weather.

Every generator has two power ratings. One is for prime power, when the generator runs continuously and is the sole source of power. A second rating for the same machine, the standby rating, is between 15% and 20% higher. The standby rating assumes that the generator will be used only sporadically, that it typically has to run only for 10 minutes to clear the building and that it will never see enough operation to wear out.

Selecting which rating to use requires judgment that varies from site to site. Standby ratings can generally be used when the generator must run for only a few minutes or hours at a time. If the unit must run continuously for several days, prime power would be more appropriate.

Two other factors affect ratings. As the temperature of the outside air rises, the generator's capacity must be decreased. The same thing happens as the altitude above sea level climbs.

Jerry Kramer of U.S. Sprint Communications Co. in Dallas ran into this derating problem when he tried to evaluate prices from different vendors on a 750-kVA generator.

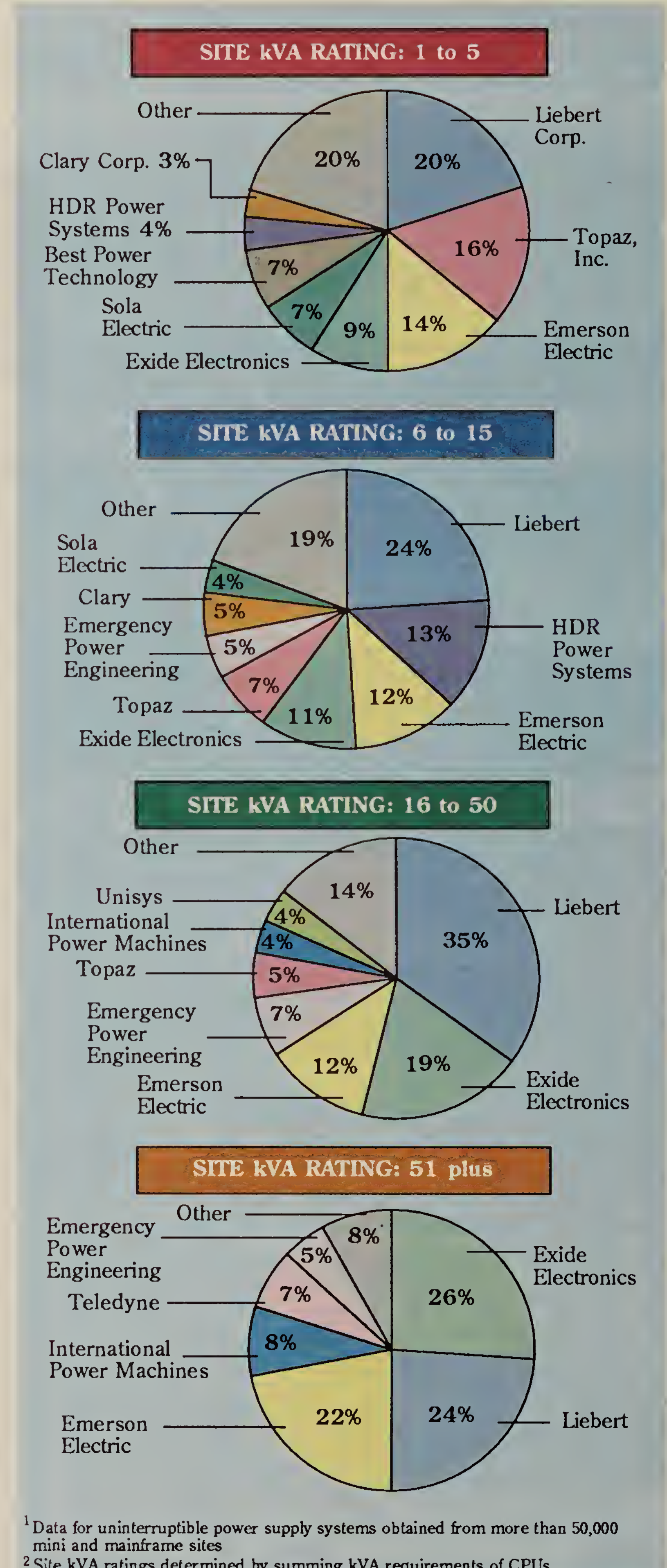
"The price from our local supplier was significantly higher than one from out of state," Kramer says. "The difference turned out to be that the local people increased the size of the engine's cooling system in anticipation of operating during Dallas's 100-plus days per year when temperatures regularly exceeded 100° F. In contrast, the out-of-state vendor assumed an 85° F maximum ambient that was totally unrealistic."

Multiple generators and paralleling switch gear can be used when the capacity of a single generator is not sufficient to power the entire interruptible load. If multiple generators are used and one fails to start, special controls must be installed to reduce the interruptible load to what the on-line generators can produce.

Generating capacity is typically sized for between two and three times the uninterruptible power system's end-user rating. This provides an allowance for supplying the computer's cooling and auxiliary support equipment in addition to its own power requirements. The generator's frequency and voltage regulation characteristics must fit within the allowable operating range of both the computer and the UPS.

Supplier market shares of installed UPS systems[1]

U.S. markets defined by site kVA ratings[2]



[1] Data for uninterruptible power supply systems obtained from more than 50,000 mini and mainframe sites

[2] Site kVA ratings determined by summing kVA requirements of CPUs and disk drives

INFORMATION PROVIDED BY COMPUTER INTELLIGENCE

In terms of installation requirements, a free flow of air is necessary, the cooling system needs sufficient capacity and antifreeze, and the exhaust must not be impeded.

In addition, the generator must be able to start large air-conditioning motors without letting the voltage or frequency drop to unacceptable levels. If the generator exceeds the operating range of the UPS or if the UPS malfunctions, the critical load will pass directly to the generator.

Data centers must store sufficient fuel on-site to support continuous operation until replacement deliveries can reliably be anticipated. Normally, this would require a minimum of at least a one- to two-day supply.

The physical aspects of running unattended must be considered with controls and alarms to summon help when needed. To be ready for any emergency, the generator should be tested regularly with at least a half, but preferably a full, load and should run long enough to really get hot and make demands on all supporting subsystems.

Many sites mistakenly think it is adequate to run the generator once a week without using any load for the test. In terms of ensuring emergency readiness, this type of testing creates only an illusion of security. If no load-testing is done for an extended length of time, the engine is likely to die when it is called on to deliver full horsepower.

In recognition of this as a widespread problem, the National Electrical Code was recently changed to require hospitals to test the generators in their emergency power systems under load.

Stan Hobbs, vice-president of operations at Cummins North Atlantic, Inc., an emergency generator supplier in Dedham, Mass., concurs. "When you run your emergency generator once a week without load," he says, "you have absolutely no assurance that the engine or the generator are capable of delivering enough power to carry your load."

Computer room power distribution. Conditioned, uninterrupted power is taken from the critical power bus and distributed to panels or power distribution modules located inside the computer room. The best way is to draw power from the critical bus and to step it down using a shielded isolation transformer after getting inside the computer room. Individual circuits then deliver power to wherever it is needed.

Emergency power-off stations must be provided at every computer room exit to shut off all electrical power in the event of an emergency. These stations and all electrical equipment should be isolated and physically covered to prevent accidental operation. All circuits should be labeled with a description and location of the equipment supplied.

Grounding. Grounding is such a critical function that it deserves its own UPS category. Grounding performs three functions:

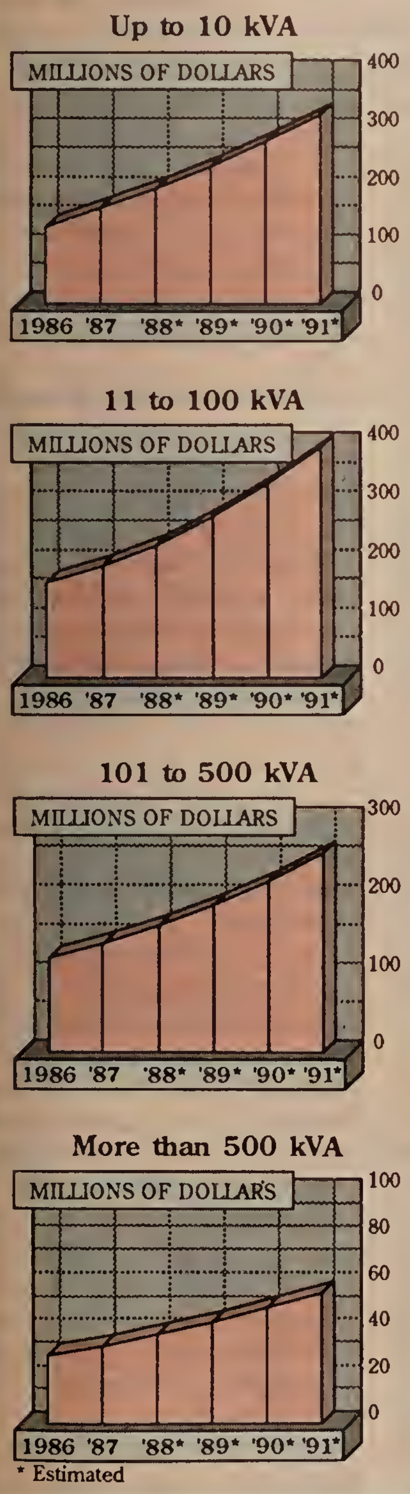
- It prevents operators and technicians from being shocked or, in the worst case, from being electrocuted.
- It ensures that circuit breakers open before electrical malfunctions can develop into fires.
- It provides the return path for the computer's own internal processing signals.

To people not well versed in computer room electrical design, these requirements may appear to be conflicting. When the computer is acting erratically and tempers are rising, lifting all the electrical grounds and forgetting about safety considerations is all too easy. But management should realize that this short-term fix carries a very large cost.

With computer clock speeds rapidly climbing into the megahertz range, the electrical function performed by grounding has become much more complex. Not only must the ground provide a low impedance path at power frequencies, it must also be a low impedance path at megahertz clock frequencies.

Sales trends in on-line UPS systems

Dollar value of shipments by power rating, 1986 to 1991



INFORMATION PROVIDED BY VENTURE DEVELOPMENT CORP.
CW CHART

> WHEN THE computer is acting erratically and tempers are rising, forgetting about safety considerations is all too easy. But short-term fixes carry very large costs.

For computers operating at 5 million instructions per second or higher, this means installing two different yet integrated grounding schemes. Otherwise the existing ground can become an antenna for unwanted electrical noise.

The only way to know whether a complex system will work as designed is to test it under conditions that simulate a real emergency. Readiness testing is an important part of UPS system performance, and provisions for emergency readiness testing need to be anticipated and built into every other subsystem.

Test relentlessly

Readiness tests should be conducted off-line so equipment malfunctions can not affect the live computer load. This can be done by using a load bank, which is little more than thousands of light bulbs that can be switched on and off at will to simulate the effect of an electrical load.

In addition to readiness testing, the load bank can be used to test or qualify any systems maintenance or repair work before equipment is allowed to return to service.

Because testing generates a lot of heat, a load bank should be located outside or a means should be supplied for circulating outside air.

A user at the Canadian bank says, "If I were installing a UPS system, I'd want to burn it in for four to six weeks. Power systems are complex pieces of equipment, and I don't want to use my computer load for on-line debugging." •

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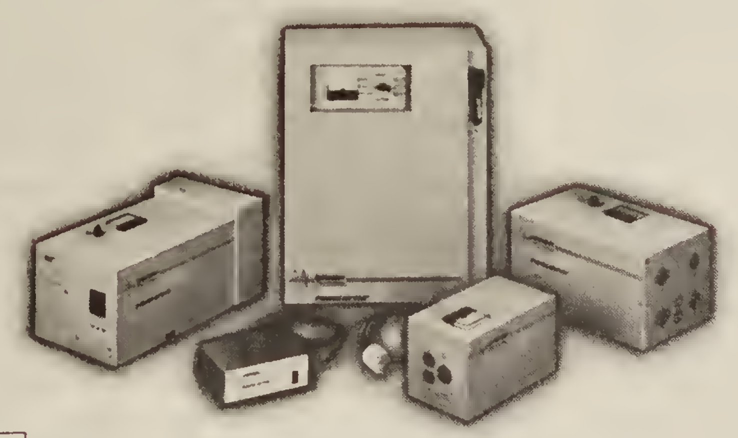

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Transient voltage surges: Cushioning their impact

BY HOWARD COOPER

A computer's greatest strengths are also its greatest vulnerabilities. Technologies such as large-scale integrated circuits, microprocessors and low-power CMOS chips are easily damaged or confused by power glitches caused by voltage transients.

Transients are fast-rising overvoltages with a total time duration of less than 1 msec. Transients can rise to peak amplifications of several thousand volts within a few nanoseconds and decay within several microseconds. Since these can force or find their way through DC power supplies and into electronic circuits, they have become the subject of great concern, research and study.

We pack several thousand transistors onto a 0.1-in.-square integrated circuit chip and expect them to perform several million operations per second by detecting fast voltage-level changes between 0V and 5V. When a transient finds its way into the main 5V DC power line or onto logic lines, it can create havoc.

Because transients are misinterpreted as data pulses, the system receiving them will perform functions not called for or will temporarily forget what it is doing. CMOS microprocessors will lock up if transients take I/O lines lower than -0.6V.

We've all heard the phrases, "It just lost memory" or "The system just locked up." These events are typical disruptive effects of transients, disruptive because once the system is rebooted, circuits are reset and proper memory data loaded back into the system, the system runs fine.

The effect of lightning storm transients or transients from motor equipment is stressful on integrated circuit chips, and damage accumulates inside the electronic component. Then, one day, a small transient or surge generates as the system is turned on, and a circuit board fails.

An ounce of prevention

Trying to run current-day computers, telephone switch equipment or industrial controllers on commercial-grade power often results in operational setbacks. Simple protective steps can be taken to eliminate such power disturbance failures in computers; industrial controls; electronic key systems; and building management heating, ventilation and air conditioning microcomputer systems. These steps reduce maintenance frustrations, overhead costs and business losses.

Unfortunately, companies often discover their protection options only after the fact.

Chubb & Sons Insurance Group in Warren, N.J., for example, was affected by lightning several times during the summers of 1984 and '85. The strikes caused massive outages in the private branch exchange, the building management systems, computers and office computer terminals. A maintenance contract covered repair costs for the phone system, but the company estimated business losses at more than $1 million.

Subsequently, Chubb installed a couple of grounding changes and proper transient-suppression equipment throughout the building. The insurance company has reported no failures in the past two years. The cost of proper protection was $30,000.

A pound of cure

In another instance, Warner-Ishi Co., an automobile engine component manufacturer in Shelbyville, Ill., built a totally new computer-controlled manufacturing and assembly facility that uses computer numerical control machine tools, computer management systems, computerized inventory and shipping and receiving systems with shuttle automatic guided vehicle robots.

In the first two years, frequent equipment and computer downtime — an average of four to six hours, three to five times a week — caused large losses. Because this facility was designed for just-in-time manufacturing, downtime cost as much as $2,300 per hour.

The company monitored power lines and was able to correlate the timing of power bumps with that of equipment malfunctions or failures. Again, the solution was to install, at strategic points within each machine and system, appropriate transient voltage surge suppressor (TVSS) devices.

This measure resulted in absolutely no failures cited anywhere for more than four months and only five or six related failures reported in the past 1½ years. In this case, a protection expenditure of some $25,000 has yielded annual savings exceeding $2 million.

As these examples illustrate, to assume that line transformers and filters are sufficient protection against power surges is a grave mistake.

Transformers and filters are like shock absorbers on a car: They average, or smooth, the bumps but offer little or no help against a voltage transient, which can be likened in its effect to the shock of hitting a large pothole.

A transient completely saturates the energy-smoothing capability of filters and forces its way through the whole system, causing problems unless a suppressor is there to absorb its destructive impact.

Suppression

A TVSS device should be installed at each change-of-voltage point within the AC distribution system. This allows the facility and system transformers to be used to achieve tighter clamping. A local TVSS should also be placed in the system being protected to stop transients generated within the building from getting to the system.

These smaller TVSS devices are needed because 65% of all transients are generated by equipment within the building. If this scheme of installation is not possible or not cost-justifiable, then a single TVSS device with series inductance and filtering built in should be applied at the system's AC power input.

Suppression is different from most power conditioning techniques in that it does not smooth distortions along the sine wave. Simple suppression components clamp onto a transient after the transient has exceeded the nominal peak voltage of the sine wave. A threshold is set that triggers the suppression circuit or device.

Some suppression devices crowbar, or shunt, the excess energy to ground. A better technique is to clamp and force the voltage between the AC hot and AC neutral lines. This technique keeps voltage within proper thresholds by dissipating transient energy as heat within the TVSS and out along line-side power wires.

Key capabilities or specifications for a good suppression system include the following:

- Speed or response time slower than 1 nsec. Slower suppression devices will allow transient energy to pass by before they are able to respond.
- Energy-absorbing capabilities and maximum transient current of 15KA for 20 microsec.
- Initial voltage threshold that is 15% to 20% higher than nominal peak voltage (140V RMS or 200V peak for nominal 120V AC) and maximum voltage threshold of no more than double the initial clamping voltage.
- RF traps and voltage-smoothing filters should also be incorporated into the network of high-speed and high-energy suppressors to kill harmonic ringing, which is sometimes generated as the transient is clipped off to a low-amplitude high-energy square wave.

Good grounding

Though not a power-conditioning device, good grounding is recommended to improve performance of any and all types of power-conditioning equipment.

If transient suppressors and filters are well grounded, they will be more efficient. The best grounding connection would be a heavy, continuous ground line from the computer all the way back to the electrical service-entrance ground connection. Local ground rods should exhibit less than 3-ohms resistance through ground and back to service-entrance or electrical system common ground.

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If local ground rods or the building's steel grounds are used, they should connect to the transformer output-neutral ground tie point and not to metal cabinets or water pipes. This will eliminate common-mode problems and avoid ground loop currents.

Dedicated lines

A dedicated line is not a power-conditioning device. This technique should be mentioned, however, because it is so widely used and often expected to perform as a cure-all for computer and electronic equipment problems.

A dedicated line is nothing more than a separate power line brought directly from a power distribution panel to the electronic system.

What this setup avoids is the possibility of common-mode problems between neutral and ground and power disruptions caused by other pieces of equipment on the same line. It does not, however, stop transients coming from the utility company lines, from Mother Nature or from other equipment fed by the same power distribution panel.

In establishing a step-by-step sequence for cost-effective implementation of power-conditioning devices, it is best to start with transient suppression.

This measure is the least expensive as well as the easiest to install because it offers the best odds for eliminating electronic system problems. The entire sequence progresses as follows:

- Install a transient suppression system at the circuit breaker cabinet and at the equipment AC power entrance (physically at 120V AC or 208V AC power as it enters equipment DC power supplies).

Suppression at the circuit breaker box acts as heavy-duty protection for all circuits from that box and prevents transients originating at one of these circuits from getting into the critical circuit. Suppression at the equipment AC plug-in will stop transients generated by nearby equipment.

Field experience has shown far better electronic reliability and data integrity when both line and load-side suppression is applied.

Typical results show an 80% to 90% reduction in circuit board failures plus elimination of disruptive problems. Physical location of suppression networks is important in eliminating transient disturbances. Therefore, an equipment survey by a qualified engineer or consultant may be advisable.

If suppression does not cure all system problems, take these steps:

- Check wiring and grounding for poor contact, resistive breaks and poor grounding.
- Check for loose circuit boards or loose cable connections. These, like heat buildup, can cause symptoms that look very much like power disturbances.
- Install a regulation/isolation transformer between line and load suppressors. Make sure the kVA rating is about 20% higher than the system's actual peak kilowatt demand. This will provide better regulation over a wider demand or power in fluctuation range.
- With a good power-conditioning transformer between line and load suppressors, the only remaining disturbances are long-duration brownouts or power blackouts. While these would never cause circuit board failure, they could cause hard-disk crashes or loss of data if systems require a graceful shutdown sequence. In these instances, an uninterruptible power supply (UPS) is required. You will still want TVSS to protect the UPS system from surges.

A practical understanding and approach to power conditioning is the most cost-effective step you can take to reduce downtime and disruption. •

Cooper is an electronic reliability consultant in Kaysville, Utah.

The computer's Achilles' heel

BY DAVID GABEL

It is now common for a computer site to protect all its power lines from inadvertent disturbances. By and large, the user community is well aware of the need to provide some protection to the power lines that are the lifeblood of the data center.

What is often forgotten, however, is the fact that other electrical lines — data communications lines — come into the data center from the outside. When these lines are unprotected, a site is open to more than one hazard.

At the minimum, outside interference with communications lines may cause poor-quality transmission and result in dropped bits and garbled information. In a worst-case situation, unprotected data communications lines could provide an ingress for destructive disturbances capable of bringing down the whole system and causing millions of dollars in damage.

> IN A worst-case situation, unprotected data communications lines could provide an ingress for destructive disturbances capable of bringing down the whole system and causing millions of dollars in damage.

When either of these things occur, most people are not prepared. In fact, most people do not even realize that the communications line could be the culprit.

Understanding why this is the case is not difficult.

Telephone lines are very reliable. The telephone almost never fails, and while a phone line is sometimes noisy in a thunderstorm, it doesn't harm anyone. But data communications lines, unlike voice-grade telephone lines, have often been the source of problems in computer operations.

When lightning strikes

For example, in a Westinghouse Electric Corp. installation in Orlando, Fla., a stroke of lightning caused around $200,000 in damage to communications cards, according to Bill Thomas, manager of computer services, data communications and computer operations at the Westinghouse facility. Thomas says the lightning entered the system through lines used for communications between terminals and mainframes.

Susan Roberts, manager of computer operations at Gustavus Adolphus College in St. Peter, Minn., says her installation has experienced problems with communications line vulnerability and lightning as well.

"If we get a direct hit, it will run to the terminals and destroy some chips," Roberts says. "It happened a lot last summer."

Orlando and St. Peter are located in parts of the country where lightning is commonplace.

This is also the case in Albion, Mich., where Jeri Palmer, a system manager for Albion College, notes, "This year, we've had a lightning problem every couple of weeks. If there's an electrical storm in the area, then we'll get hit. If we get hit hard, then it will blow our VT220s and the communications ports on the other end of the communications line."

The active factor in all these situations is lightning, but internal events such as a hot power line dropping across a communications line can produce the same effect, according to John Sullivan, a computer power consultant in Half Moon Bay, Calif.

No garden-varieties

What can a company do to protect its communications lines from such hazards? According to Sullivan, the first defense is a good ground. But, he adds, not just any garden-variety ground will do.

Communications circuits require protectors that will not interfere with the data and cause degradation of service. Furthermore, if a protector fails, it must do so in such a way that it still protects the circuit, the way a fuse in a fuse box fails and still protects household wiring.

"It must recover without damage after a transient surge," Sullivan says, "and you want to make sure the grounding is suitable for the device."

There are two parts to an adequate grounding system: a circuit protection device and a grounding line. Both parts must be well calibrated to perform at the required level.

The circuit protection device acts like a valve, directing current into the ground line and away from a circuit — for example, a communications line — that could be damaged by a current surge.

If a circuit protection device can carry away all of a damaging current pulse but the ground wire cannot handle the current, then the damaging current will flow through the supposedly protected circuit, not into the ground.

As Larry Rea, an Austin, Texas-based consultant, says, "You have to marry the capabilities of the ground in the building and the protection device."

Sullivan says a host of protection products are available for RJ11 phone jacks, for RS-232C and RS-422 lines and for coaxial cable used with local-area networks. "Anyone in the power protection business is getting into phones [communications] as well," he says.

But how does one marry communications lines to the ground? Site engineers have to be called in to measure the quality of the ground and improve it, if necessary.

"We had lightning rods buried in soil, and we were using them as the main electrical ground," Westinghouse's Thomas explains. "Then the water table dropped below the level of the rods, and then we had a lightning storm." When the water table drops, the quality of the ground connection suffers. "We took a hit in the building," he says.

After that, the company dug 60 feet deeper into the ground, which was definitely into the water table, and buried the rods.

Preventing dropped bits

If the problem is the less serious but more prevalent one — loss of data in transmissions — it may be easier to clean up.

Art Clawson, president of Perimeter Security and Sound, Inc., a San Jose, Calif., company that installs and services networks, relies on a combination of shielded wire and grounding.

"I find that most people who run communications lines don't use shields," he says. "We use shielded twisted-pair wiring and only ground the cable on one side. That solves most of the problems I've seen."

Communications lines should also be kept from paralleling steel girders in ceilings and running too close to the outside walls, where a lightning strike would be bled away into the lines by the building's lightning-arrestor system. It is also important to insulate lines from noise emanating from devices like transformers in fluorescent light fixtures.

"It's never the dollars spent that are the problem," consultant Rea says. "It's the attention to detail on all parts of the communications system and the techniques of installing and maintaining that make the difference." •

Gabel is a free-lance writer based in Northport, N.Y.

VENDOR VIEWPOINT

There's safer power for you and your PCs

BY BOB MCGINNIS

The personal computer segment of the power industry really only started in the early 1980s. In a rather short time, however, this technology has grown rapidly.

Two major factors fueled the growth of backup power systems for PCs. The first is the increasing value of the data processed on these machines and the fact that PCs are quickly exceeding the capabilities of the mainframes of only a few years ago. The nature of PC computing is moving from productivity enhancement to core corporate information processing.

The second is the steady decline in the quality of available electrical power. This diminishment is the result of increasingly complex power grids from several generating sources.

Complex distribution

The life cycle of building a power plant, from planning through construction, lasts about 10 to 15 years. However, during the past 10 years, utilities have been criticized for nuclear power hazards and coal plant emissions. Therefore, very few newly planned power-generation facilities have been constructed. As a result, most of the power in many states will be supplied from distant plants, complete with the problems that arise from such complex distribution.

The backup power market for micros has grown between 25% and 30% per year for the past several years. Although this growth is somewhat coupled with the size of the PC market, only about 5% of the installed base of PCs have backup power. Therefore, the opportunity for it is strong even in periods of slack computer sales. Evidence attests that users are more aware of the impact of power quality on their computer systems; many purchase backup power systems with the computer.

Market growth has increased the number of companies in the backup power market. Three general types of players exist: suppliers of uninterruptible power supplies (UPS) for mainframe computers; small, PC-oriented backup power companies; and off-shore manufacturers.

Firms that manufacture large UPS systems are seeing their markets shrink with the spread of PCs and are moving into the lower power area. However, these companies do not have PC marketing expertise, which has prevented them, so far, from sweeping away smaller competitors. Many small firms entered the business because the technology and markets appeared easy to penetrate. Not many have succeeded.

Finally, several entrants from the Far East emphasize price. However, these firms do not always understand the market and the need for long-term support. In at least one case, a major importer completely withdrew its maintenance support of older products. With both demand and the number of supply sources on the upswing, it is hardly surprising that the technology itself has undergone some major changes.

> MANY small firms entered the business because the technology and markets appeared easy to penetrate. Not many have succeeded.

The first backup power units to make a significant impact on the low-power market were standby power units — units that use utility power until a power failure occurs. Most of these units used the uncomplicated "square-wave" design. This approach works well with computer power supplies and is the most cost-effective.

As a result of the need to be "one up" in a competitive marketplace, many manufacturers have introduced sine-wave outputs or on-line systems that continuously generate the output power. These improvements generally increase the basic cost of the units. More sophisticated integrated circuit technology and microprocessors alleviate some of the cost, however.

For the rest of this year and into 1988, we will likely see a spurt in market growth in conjunction with the anticipated growth of PC sales. We will also see increased capability in backup power units at lower prices. It looks like we've reached the classic market scenario in technical commodity products. •

McGinnis is president of Safe Power Systems, Inc. in Tempe, Ariz.

MIS assumes a shirt-sleeves approach to protecting power

BY JEFF GOODWIN

Just as individuals do more of their own computing these days, MIS managers handle an increasing amount of UPS selection and installation on their own, at least in small and medium-size systems. Several industry trends working in combination appear to be responsible for this development.

Both the increased use of transistor technology in uninterruptible power supply (UPS) systems and their reduced size help make the purchase decision less intimidating. Today, more power comes in smaller packages, and UPSs come in a wide range of power ratings, which makes it easier to tailor size to need.

Lower unit costs reinforce autonomous tendencies. The procurement of a UPS today may consume as little as 5% of the MIS budget and require no formal cost justification.

Mike Allen, director of MIS at Doctors Hospital in Columbus, Ohio, recouped the cost of his 10- and 50-kVA UPSs from Solid State Controls, Inc. in one fell swoop when he upgraded the communications lines between buildings with a T1 link.

Allen notes, "The $70,000 total for the UPSs wasn't even half of what I saved on the communications gear." Allen, who hails from a field-service background, says he selected, sized and installed his own equipment without any problems.

Another factor that encourages an independent approach to UPS implementation is MIS's perception that it is a proven technology that is relatively easy to learn.

> GIVEN that the MIS professional is accustomed to educating himself, when he is confronted by the need for a UPS, he is likely to view it as merely another subject to be assimilated.

A great deal of evidence supports this perception. Many UPS vendors have been in business for more than 10 years, and there is a large installed base of systems. Given that the MIS professional is accustomed to educating himself about technologies and developments in his field, when he is confronted by the need for a UPS, he is likely to view it as merely another subject to be assimilated.

David Noonan, information systems vice-president at Greenwich, Conn.-based Stolt Nielson Corp., the world's largest manufacturer of chemical tankers, was forced to undertake a search for a UPS two years ago. Noonan could call on a much more extensive background in power technology than most MIS managers could.

Early in his career, Noonan was a systems engineer who wrestled regularly with battery-backed power supplies. Still, he came away from the selection process with the impression that experience like his was not really necessary and that other MIS managers should be able to choose a successful power solution through self-education, rigorous vendor appraisal and logical deduction.

"You are dealing with a mature technology where, basically, it's hard to go wrong," Noonan says. "You can deal with the vendors and their representatives with a great deal of confidence."

Do-it-yourself dangers

This kind of attitude is anathema to consultants in the field who, while admitting there may be exceptions, vehemently oppose any suggestion that the average MIS manager can go it alone on power protection.

Robert Holtaway, president of Frank Holtaway and Son, Inc., a North Plainfield, N.J.-based consulting firm, has worked in the industry since 1964 and is unequivocal about the foolhardiness of MIS personnel who install UPS equipment on their own. "That's why we have a very high retrofit business," says Holtaway, who estimates that 75% of his UPS consulting work is devoted to correcting installation mistakes made by inexperienced contractors and computer professionals.

According to Holtaway, it isn't just the hardware but rather its proper installation that is so difficult. "It's a much more complicated task than can be grasped in a few seminars," he says. "Less than half of these people really understand what they're getting."

The only thing worse than an MIS person trying to do everything himself, Holtaway asserts, is careless surrender of control to turnkey vendors or building contractors. This often happens when there is pressure to meet intense site construction schedules, he says.

Such shortcuts can lead to frustrating situations such as one encountered by a bank in which a power protection system was installed without a maintenance bypass. The bank later became one of Holtaway's clients.

Stolt Nielson's Noonan

Paul Katzaroff, president of the consulting firm PRK Associates Consulting Engineers in Redondo Beach, Calif., says the problem is not that MIS managers attempt to do too much themselves but that they fail to take responsibility for communicating their needs to those who implement the technology.

"Sometimes, even when DP is aware that a new facility is being built for them," he says, "they are unwilling to go to the operations staff and request that a consultant review the drawings."

Large organizations with communications blockages are not the only ones that need help, consultants argue. "I've seen botched jobs from 10 kVA on up," Holtaway declares.

Some MIS managers contend, however, that the problems they run into on their own have been minor and manageable.

Angelos Spetseris, manager of technical support at Commerce Insurance Co. in Webster, Mass., for example, dealt with no one but a vendor of his own selection when he first needed to install backup power for an IBM System/38 machine.

Spetseris's background in electricity consisted of one undergraduate physics course, but he felt comfortable with the transistorized UPSs he discovered in various trade articles.

He dug into the technology and eventually selected UPS equipment from Lortec Power Systems, a manufacturer based in Elyria, Ohio.

A Lortec representative went to Spetseris's site, performed a complete electrical inspection, installed the UPS in a basement and wired it to the computer on the third floor of the building. The power problems vanished.

Right and wrong

Encouraged by this success, Spetseris did not hesitate to move the computer to a new first-floor location when the need arose. This time, however, he made one mistake: He relied on an electrical contractor with little UPS experience to perform the new wiring.

Grounding problems between the UPS and the computer eventually surfaced and reduced the protection effectiveness of the unit to 80%. Spetseris had to call Lortec back to diagnose the causes and recommend corrective action.

Two and a half years after the first UPS was installed, Spetseris put in another to provide backup power for a second System/38. This time, he says, he employed an electrical engineer who performed the installation in coordination with Lortec.

For Spetseris, the problems he encountered were no worse than with any new equipment he installs. He says he is satisfied with the performance of his installation and remains unmoved in his opinion that a consultant is unnecessary, especially with all the published literature about UPS technology.

An electric situation

Even when difficulties are severe, an MIS manager may not turn to a consultant for assistance.

The approach taken at Maas, Inc., a retail department store chain based in Tampa, Fla., illustrates a potential trend in solving power quality problems.

Faced with a constant lightning threat, the manager of DP, Logan Lane, asked the building facilities group in mid-1985 to find a UPS that would protect his IBM, NCR Corp. and Wang Laboratories, Inc. machines at the main receiving and operations warehouse. The building staff selected a UPS vendor, which then neglected certain critical design details and misled them about the importance of proper installation, according to Bill Aaron, manager of special projects for Tampa Electric Co (Teco).

Aaron became involved this February when Maas placed a desperate call to Teco's engineering services group. Battery cells in the UPS, located in a steamy receiving area, exploded, and major components had failed. It turned out to be a case of perfect timing, since Teco had been evaluating a contract with UPS manufacturer Solidstate Controls, Inc. since December 1986.

Aaron and his staff drew up a proposal for Lane and, within 10 weeks of authorization, replaced the defective 75-kVA UPS with a 150-kVA Model 5150 from Solidstate, beefed up the wiring and built an air-conditioned room around the unit. It provided a full-service, monthly lease financing option that included parts and labor. Thus far, there have been no power-related problems reported since the installation was completed.

Aaron explains why Teco decided to take a more active role in providing clean power to its customers.

"Traditionally, we had acted in the role of facilitator, providing seminars in which our customers and UPS manufacturers could meet," he says. "However, we found we got blamed for the bad installations and received no credit for the successful ones."

Teco formed a committee, drew up a list of potential vendors to interview and eventually signed a value-added reseller contract with Solidstate.

Utility counselors

Baltimore Gas and Electric Co. and Florida Power Co. have begun similar programs to Teco's, and other utilities are starting to evaluate this type of service, according to Aaron.

Frank Smith, senior manager of information security services at Datapro Research Corp. in Riverside, N.J., agrees that the power companies are "making it known that instead of hiring a consultant, customers can go to them for expert advice."

The presence of yet another option for outside counsel may divert some MIS managers from trying their hand at power backup management.

In the meantime, however, individuals like Don Beard, manager of operations for the American Trucking Association in Alexandria, Va., will continue to travel the self-sufficient route.

Beard calmly oversaw the installation of motor-generators and inverters to eliminate 1,000V spikes from his site, leaving behind one more tale of success to entice the uninitiated. •

Goodwin is an intern with *Computerworld's* Spotlight section.

Mainframe uninterruptible power supplies

COMPANY	KVA RANGE FOR TOTAL PRODUCT LINE	PRODUCT	ON-LINE OR STANDBY	RESPONSE INTERVAL (msec)	INPUT VOLTAGE/TOLERANCE	OUTPUT VOLTAGE/ TOLERANCE	PHASE	FREQUENCY (Hz)	POWER RATING (kVA)	BUILT-IN BATTERY/ PROTECTION TIME	TOTAL HARMONIC DISTORTION OF SINE WAVE OUTPUT	SIZE (height, width, depth in in.)	WEIGHT (lb)	NOISE LEVEL (db)	TEMPERATURE/RELATIVE HUMIDITY REQUIREMENTS	MEAN TIME BETWEEN FAILURES (hours)	PRICE
Advance Conversion Devices Co. (201) 989-0095	—	U86-1	On-line	None	115/ 230V AC/ ± 10%	115V AC/ ± 2%	Single	60	5000VA	No	5%	38.5 x 21 x 24	520	—	-40°C-50°C/100%	50,000	$14,290
Atlas Energy Systems, Inc. (714) 863-0900	10kVA-1000kVA	Series 2000/RP 66040	On-line	None	208, 230, 480V AC/ ± 40%	208, 230, 480V AC/ ± 1%	Three	60	40kVA	No	2%	60 x 34 x 75	3,200	65	-40°C-50°C/95%	100,000	$46,500
	—	Series 4000/RP 661000	On-line	None	208, 230, 480V AC/ ± 40%	208, 230, 480V AC/ ± 1%	Three	60	1000kVA	No	2%	75 x 61 x 229	18,500	75	-40°C-50°C/95%	100,000	$250,000
Computer Power, Inc. (201) 638-8000	.4kVA-600kVA	Trimax	On-line	None	120, 208V AC/ ± 10%	120, 208V AC/ ± 2%	Three	50, 60	60kVA	No	5%	71 x 52 x 32	2,650	66	0°C-40°C/95%	—	$44,000
	—	Trimax 250kVA	On-line	None	120, 208V AC/ + 10%, -15%	120, 208V AC/ ± 2%	Three	50, 60	250kVA	No	4%	79 x 146 x 40	7,700	70	0°C-40°C/95%	—	$84,188
Cyberex, Inc. (216) 946-1783	5kVA-426kVA	SIII/plus	On-line	None	208, 480V AC/ + 10%, -20%	208, 480V AC/ ± 1%	Three	50, 60	100kVA	No	5%	77 x 74 x 36	4,800	—	0°C-40°C/95%	100,000	$49,900
	—	SIII/plus	On-line	None	480V AC/ + 10%, -15%	480V AC/ ± 1%	Three	50, 60	313kVA	No	3%	77 x 169 x 36	13,900	—	0°C-40°C/95%	100,000	$89,900
Emergency Power Engineering, Inc. (714) 557-1636	.25kVA-80kVA	EPS-2000	On-line	None	208/120, 230/240, 480/ 600V AC/ ± 15%	208/120, 480/277/ ± 5%	Three	60	40kVA	No	5%	55.2 x 31.5 x 32	1,385	60	32°F-104°F/95%	135,000	Not available
	—	EPS-200/80kVA	On-line	None	208/120, 230/240, 480/ 600V AC/ ± 15%	208/120, 480/277/ ± 5%	Three	60	80kVA	No	5%	55.2 x 45 x 32	2,250	60	32°F-104°F/95%	135,000	Not available
Emerson Electric Corp. (714) 545-5581	.2kVA-750kVA	AP300	On-line	None	120/208; 277/480 V AC/ + 10%, -15%	120/208; 277/480 V AC ± 1%	Three	50, 60	15kVA	Varies	5%	36 x 26 x 72	1,000	65	0°C-40°C/95%	—	Not available
	—	AP500	On-line	None	208, 480, 600 V AC/ + 10%, -15%	120-600 V AC ±.3%	Three	60	750kVA	No	5%	102 x 40 x 78	16,000	75	0°C-40°C/95%	—	Not available
Energy Electric Systems, Inc. (301) 252-2240	440kVA-800kVA	EES 525 UPS	On-line	None	117V AC/—	117V AC/ ± 8%	Single	60	440kVA	Yes, 7-10 min	5%	2.2 x 15 x 15.74	24	—	0°C-37°C/95%	—	$995
	—	EES 1000 UPS	On-line	None	117V AC/—	117V AC/ ± 8%	Single	60	800kVA	Yes, 5 min	5%	2.2 x 17.75 x 16	29	—	0°C-37°C/95%	—	$1,595
Exide Electronics Corp. (919) 872-3020	1.5kVA-8000kVA	Model 2045	On-line	None	208, 120V AC/ + 10$, -15%	208, 120V AC/ ± 1%	Three	60	56.25kVA	Yes, 5 min	5%	72 x 83 x 31	4,840	65	0°C-40°C/95%	100,000	$56,200
	—	System 125 Model 125	On-line	None	208, 120V AC/ + 10%, -15%	208, 120V AC/ ± 1%	Three	60	125kVA	Yes, 3 min	5%	72 x 72 x 31.5	6,400	65	0°C-40°C/95%	100,000	$80,000
General Power Systems, Inc. (714) 956-9321	.5kVA-50kVA	GPS 37.5kVA On-line UPS	On-line	None	208, 480V AC/ + 10%, -15%	120/208, 277/ 480V AC/ ± 2%	Three	60	37.5kVA	No	3%	69.5 x 30 x 33	2,246	65	0°C-40°C/95%	100,000	$39,200-$41,500
	—	GPS 50kVA On-line UPS	On-line	None	208, 480V AC/ + 10%, -15%	120/208, 277/ 480V AC/ ± 2%	Three	60	50kVA	No	3%	69.5 x 30 x 33	2,942	65	0°C-40°C/95%	100,000	$43,750-$45,450
HDR Power Systems, Inc. (614) 262-6832	2.5kVA-150kVA	3100	On-line	None	208, 240V AC/ ± 10%	208, 240V AC/ ± 2%	Three	60	100kVA	Yes, 10 min	5%	87 x 56 x 33.5	10,000	68	0°C-40°C/95%	200,000	$58,000
	—	3100/50K	On-line	None	208, 240V AC/ ± 10%	208, 240V AC/ ± 2%	Three	60	50kVA	Yes, 20 min	5%	87 x 56 x 33.5	6,500	65	0°C-40°C/95%	200,000	$43,000
Imunelec, Inc. (516) 364-8008	.3kVA-140kVA	GSI Series 60	On-line	None	120, 208V AC/ ± 10%	120, 208V AC/ ± 1%	Three	60	60kVA	Yes, 10 min	4%	75 x 72 x 33	5,290	60	32°F-105°F/95%	45,000	$50,012
	—	GSI Series 140	On-line	None	120, 208V AC/ ± 10%	120, 208V AC/ ± 1%	Three	60	140kVA	Yes, 10 min	4%	75 x 26 x 33	9,250	65	32°F-105°F/95%	45,000	$76,317
International Power Machines, Inc. (800) 527-1208	20kVA-600kVA	Transistorized Endless Power UPS	On-line	None	200-600V AC/ + 10%, -15%	208V AC/ ± 1%	Three	—	40, 80kVA	No	5%	76 x 64 x 32	2,450-3,100	58	0°C-40°C/95%	100,000	Not available
	—	Durable Power UPS	On-line	None	200-600V AC/ + 10%, -15%	208-600V AC/ ± 1%	Three	50, 60	38KVVA-600kVA	No	5%	78 x 35 x 70	2,800-18,800	67-74	0°C-40°C/95%	100,000	Not available
Liebert Corp. (614) 888-0246	.2kVA-4000kVA	Liebert Three-Phase UPS	On-line	None	208, 480V AC/ + 10%, -15%	208, 480V AC/ ± 1%	Three	50, 60	50kVA	No	5%	78 x 72 x 36	4, 500	70	32°F-104°F/95%	—	Not available
	—	Three-Phase UPS	On-line	None	480V AC/ + 10%, -15%	0.50%	Three	60	750kVA	No	5%	79 x 192 x 45	16, 000	75	0°C-40°C/95%	—	Not available
Power Systems and Controls, Inc. (804) 355-2803	200kVA-6000kVA	Series 760 Rotary UPS/200 kVA	On-line	None	208, 480V AC/ ± 10%	208, 480V AC/ ± 10%	Three	60	200kVA	Yes, 1-15 min	5%	Varies	Varies	65	0°C-40°C/95%	150,000	$100,000 (without battery)
	—	Series 760 Rotary UPS/ 1000kVA	On-line	None	480V AC/ ± 10%	480V AC/ ± 10%	Three	60	1000kVA	Yes, 1-15 min	5%	Varies	Varies	65	0°C-40°C/95%	150,000	$200,000 (without battery)

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Mini uninterruptible power supplies

COMPANY	KVA RANGE FOR TOTAL PRODUCT LINE	PRODUCT	ON-LINE OR STANDBY	RESPONSE INTERVAL (msec)	INPUT VOLTAGE/TOLERANCE	OUTPUT VOLTAGE/ TOLERANCE	PHASE	FREQUENCY (Hz)	POWER RATING (kVA)	BUILT-IN BATTERY/ PROTECTION TIME	TOTAL HARMONIC DISTORTION OF SINE WAVE OUTPUT	SIZE (height, width, depth in in.)	WEIGHT (lb)	NOISE LEVEL (db)	TEMPERATURE/RELATIVE HUMIDITY REQUIREMENTS	MEAN TIME BETWEEN FAILURES (hours)	PRICE
Abacus Controls, Inc. (201)526-6010	—	UPS 639-4	On-line	None	208V AC/ ± 10%	208V AC/ ± 3%	Three	60	30kVA	Yes, 15-60 min	3%	63 x 44 x 30	2,200	65	0°C-40°C/95%	35,000	$35,000
	—	UPS 619-4	On-line	None	208V AC/ ± 10%	208V AC/ ± 3%	Three	60	10kVA	Yes, 10-60 min	3%	63 x 22 x 30	850	65	0°C-40°C/95%	35,000	$19,650
Advance Conversion Devices Co. (201) 989-0095	36VA-15kVA	U34-1	On-line	None	120V AC/ ± 10%	115V AC/ ± 2%	Single	60	72VA	No	6%	6.75 x 17 x 7.5	33	—	-40°C-50°C/ 100%	50,000	$15,092
Alpha Technologies, Inc. (206) 647-2360	.3kVA-3kVA	Alpha 2000	NA (Ferroresonant)	None	120, 240V AC/ ± 15%	120, 240V AC/ ± 3%	Single	50, 60	2kVA	Yes, 28-125 min	5%	35 x 20.5 x 28	445	—	0°F-120°F/—	—	$4,200
	—	Alpha 3000	NA (Ferroresonant)	None	120, 240V AC/ ± 15%	120, 240V AC/ ± 3%	Single	50, 60	3kVA	Yes, 15-95 min	5%	35 x 20. 5 x 28	455	—	0°F-120°F/—	—	$4,555
AT&T (201)851-3075	1kVA-20kVA	UPS/ 10kVA	On-line	None	208V AC/ + 6%, -12%	208V AC/ ± 5%	Three	60	10kVA	Yes, 30 min	5%	65 x 27 x 30	992	60	0°C-40°C/90%	—	$23,500
	—	UPS/ 20kVA	On-line	None	208V AC/ + 6%, -12%	208V AC/ ± 5%	Three	60	20kVA	Yes, 15 min	5%	65 x 27 x 30	992	60	0°C-40°C/90%	—	$31,600
Atlas Energy Systems, Inc. (714) 863-0900	10kVA-1000kVA	Series 1000/RP 66010	On-line	None	208, 230, 480V AC/ ± 40%	208, 230, 480V AC/ ± 1%	Three	60	10kVA	No	2%	65 x 34 x 75	2,300	65	-40°C-50°C/95%	100,000	$35,000
	—	Series 1000/RP 66030	On-line	None	208, 230, 480V AC/ ± 40%	208, 230, 480V AC/ ± 1%	Three	60	30kVA	No	2%	65 x 34 x 75	2,300	65	-40°C-50°C/95%	100,000	$41,100
Avionic Instruments, Inc. (201) 388-3500	—	8A 2500	On-line	None	115, 220V AC/ ± 20%	115V AC/ ± 1%	Both	50, 60	2.5kVA	No	0.5%	9 x 12 x 22	65	45	-55°C-71°C/95%	—	$12,000-$15,000
Best Power Technology, Inc. (608) 565-7200	—	F2kVA	On-line	None	120, 208V AC/ + 10%, -20%	120, 208, 240V AC/ ± 3%	Single	60	2kVA	Yes, 30 min	5%	33 x 17 x 30	440 (with battery)	48	0°C-40°C/95%	65,000	$4,995
	—	F15kVA	On-line	None	208, 240V AC/ + 10%, -20%	120, 208, 240V AC/ ± 3%	Single	60	15kVA	No	5%	42 x 23 x 30	730	57	0°C-40°C/95%	65,000	$14,995
Clary Corp. (818) 287-6111	360VA-37.5kVA	Onguard 3kVA	On-line	None	120 or 220V AC/ + 10%, -20%	120 or 220 V AC/ ± 2%	Single	50, 60	3kVA	Yes, 10-35 min.	5%	18.7 x 9.5 x 28.5	97	49	0°C-40°C/90%	50,000	$6,290
	—	Onguard 30kVA	On-line	None	208Y, 120V AC/ + 10%, -20%	208Y, 120V AC/ ± 5%	Three	60	30kVA	No	2.5%	66 x 68 x 25	2,400	63	0°C-40°C/95%	58,000	$33,500
Computer Power, Inc. (201) 638-8000	400VA-6000kVA	Computer-save	On-line	None	120V AC/ ± 10%	120V AC/ ± 2%	Single	50, 60	3kVA	Yes, 25 min	5%	32 x 32 x 12.75	424	53	32-120°F/95%	—	$4,951
	—	Computer save/5K	On-line	None	120V AC/ ± 10%	120V AC/ ± 2%	Single	50, 60	5kVA	Yes, 12 min	5%	32 x 32 x 12.75	499	54	32°F-120°F/95%	—	$6,751
Controlled Power Co. (800) 521-4792	400VA-15kVA	Series 1000	On-line	None	120, 208, 240V AC/ + 20%, -25%	120, 208, 240V AC/ ± 3%	Single	60	2kVA	Yes, 18 min	5%	30 x 21. 5 x 34	500	45	0°C-40°C/98%	75,000	$4,990
	—	Series 1000/ 15kVA	On-line	None	208, 240V AC/ + 20%, -25%	208, 240V AC/ ± 3%	Single	60	15kVA	No	5%	44 x 45 x 34	1,650	55	0°C-40°C/98%	75,000	$12,050
Cyberex, Inc. (216) 946-1783	5kVA-426kVA	Miniups	On-line	None	208V AC/ + 10%, -20%	120, 240V AC/ ± 1%	Three	50, 60	5kVA	No	3.3%	55 x 38 x 26	910	—	0°C-40°C/95%	100,000	Not available
	—	SIII/plus	On-line	None	208, 240V AC/ + 10%, -20%	208, 480V AC/ ± 1%	Three	50, 60	30kVA	Yes, 5 min	5%	77 x 38 x34	2,500	—	0°C-40°C/ 95%	100,000	$29,900
Decision Data Computer Corp. (215) 674-3300	200VA-30kVA	5901-01	On-line	None	120V AC/ ± 10%	120V AC/ ± 2%	Single	60	3kVA	Yes, 10 min	10%	52 x 25. 5 x 18.7	485 (with battery)	60	0°C-40°C/95%	154,000	$7,900
	—	903-04	On-line	None	120, 208, 277, 480V AC/ + 10%, -15%	120, 208, 277, 480V AC/ ± 1%	Three	60	30kVA	Yes, 15 min	10%	72 x 36 x 26	1,700	65	0°C-40°C/95%	154,000	$34,450
Deltron, Inc. (800) 523-2332	400VA-5kVA	TP Series/30	On-line	None	120V AC/ ± 10%	120V AC/ ± 3%	Single	60	3kVA	Yes, 25 min	—	32 x 32 x 12.75	424	40-55	0°C-50°C/95%	—	$4,995
	—	TP Series/50	On-line	None	120V AC/ ± 10%	120V AC/ ± 3%	Single	60	5kVA	Yes, 12 min	—	32 x 32 x 12.75	499	40-55	0°C-50°C/-95%	—	$1,695
Displex, Inc. (516) 671-4400	1kVA-6.25kVA	PSU 7561	On-line	None	120V AC/ ± 20%	120V AC/ ± 2%	Single	60	6.25kVA	Yes, 20 min	5%	41 x 24 x 28	680	60	0°C-40°C/95%	55,000	$8,505
	—	PSU 7521	On-line	None	120V AC/ ± 20%	120V AC/ ± 2%	Single	60	2.5kVA	Yes, 10 min	5%	22 x 18 x 15	230	50	0°C-40°C/95%	55,000	$4,653
Electronic Protection Devices, Inc. (800) 343-1813	500VA-2kVA	Grizzly 2K	Standby	4	115V AC/ ± 5%	115V AC/ ± 5%	Single	60	2kVA	Yes, 8 min	NA	8 x 12 x 25	125	—	0°C-40°C/95%	—	$2,000
Emergency Power Engineering, Inc. (714) 557-1636	250VA-80kVA	FPS-1000	Standby	6-10	120V AC/ ± 30%	120, 208, 240V AC/ ± 3%	Single	60	2kVA	Yes, 30 min	5%	33 x 17 x 30	440	48	32°F-104°F/95%	57,000	Not available
		EPS-2000	On-line	None	208, 120, 230, 240, 480, 600V AC/ ± 15%	208, 120, 480, 277V AC/ ± 5%	Three	60	30kVA	No	5%	55.2 x 31.5 x 32	1,385	60	32°F-104°F/95%	135,000	Not available

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COMPANY	KVA RANGE FOR TOTAL PRODUCT LINE	PRODUCT	ON-LINE OR STANDBY	RESPONSE INTERVAL (msec)	INPUT VOLTAGE/TOLERANCE	OUTPUT VOLTAGE/ TOLERANCE	PHASE	FREQUENCY (Hz)	POWER RATING (kVA)	BUILT-IN BATTERY/ PROTECTION TIME	TOTAL HARMONIC DISTORTION OF SINE WAVE OUTPUT	SIZE (height, width, depth in in.)	WEIGHT (lb)	NOISE LEVEL (db)	TEMPERATURE/RELATIVE HUMIDITY REQUIREMENTS	MEAN TIME BETWEEN FAILURES (hours)	PRICE
Emerson Electric Corp. **(714) 545-5581**	.2kVA-750kVA	AP 101/3kVA	On-line	None	120, 208, 240V AC +10%, -15%	120/240V AC/ ±2%	Single	50, 60	3kVA	Yes, 10 min	5%	18.5 x 25.6 x 18.75	650	60	0°C-40°C/95%	—	$8,500
	—	AP 101/10kVA	On-line	None	120, 208, 240V AC/ +10%, -15%	120/240V AC ±2%	Single	50, 60	10kVA	10 min	5%	53.5 x 41 x 18.75	1,100	60	0°C-40°C/95%	—	$16,500
Exide Electronics, Inc. **(919) 872-3020**	1.5kVA-8000kVA	System 10 Model 6	On-line	None	208, 240V AC/ +13%, -20%	240, 120V AC/ ±3%	Single	60	6kVA	Yes, 20 min	4%	37.5 x 34 x 26	1,440	60	10°C-40°C/95%	100,000	$12,510
	—	System 20 Model 20	On-line	None	208, 120V AC/ +13%, -20%	240, 120V AC/ ±3%	Three	60	20kVA	Yes, 9 min	4%	37.5 x 34 x 26	1,625	60	10°C-40°C/95%	100,000	$29,900
General Power Systems, Inc. **(714) 956-9321**	500VA-50kVA	GPS 25kVA On-line UPS	On-line	None	208, 480V AC/ +10%, -15%	120/208, 277/480V AC/ ±2%	Three	60	25kVA	No	3%	66.5 x 27 x 30	163	60	0°C-40°C/95%	100,000	$34,680-$36,125
	—	GPS 10kVA On-line UPS	On-line	None	208, 480V AC/ +10%, -15%	120/208, 277/480V AC/ ±2%	Three	60	10kVA	Yes, 5 min.	3%	61 x 22 x 30	1,310	60	0°C-40°C/95%	100,000	$21,495-$22,085
HDR Power Systems, Inc. **(614) 262-6832**	2.5kVA-150kVA	2038	On-line	None	208, 240V AC/ ±10%	208, 240V AC/ ±2%	Three	60	3kVA	Yes, 30 min	5%	55 x 22 x 26	700	60	0°C-40°C/95%	200,000	$13,000
	—	1300	On-line	None	208, 240V AC/ ±10%	208, 240V AC/ ±2%	Single	60	30kVA	Yes, 15 min	5%	87 x 56 x 33.5	3,800	65	0°C-40°C/95%	200,000	24,000
Imunelec, Inc. **(516) 364-8008**	.3kVA-140kVA	Series 31-10	On-line	None	120, 208V AC/ +10%, -15%	120V AC/ ±1%	Three phase in, single or three phase out	60	10kVA	Yes, 10 min	5%	51 x 51 x 26	1,709	5	32°F-105°F/95%	45,000	$16,100
	—	Series 33-30	On-line	None	120, 208V AC/ +10%, -15%	120V AC/ ±1%	Three	60	30kVA	10 min	5%	73 x 89 x 30	4,437	55	32°F-105°F/ 95%	45,000	$35,352
International Power Machines Corp. **(800) 527-1208**	20kVA-600kVA	Durable Power UPS	On-line	None	208-600V AC/ ±10%	208-600V AC/ ±1%	Three	50, 60	20kVA, 25kVA	No	5%	78 x 70 x 35	2,200-2,650	67	0°C-40°C/95%	100,000	Not available
	—	Transistorized Endless Power UPS	On-line	None	208-600V AC/+10%,-15%	208-600V AC/ ±1%	Three	50, 60	32kVA-167kVA	No	5%	76 x 32 x 64	2,900-7,400	58-63	0°C-40°C/95%	100,000	Not available
Liebert Corp. **(614) 888-0246**	200VA-4000kVA	Liebert Single-Phase UPS	On-line	None	120, 208, 240V AC/ ±-15%	120, 208, 240V AC/ ±2%	Single	60, 50	2kVA	Yes, 18 min	3%	32 x 23 x 26	500	45	32°F-104°F/95%	—	Not available
		Liebert Three Phase UPS	On-line	None	208, 480, 600V AC/ ±10%	208, 480, 600V AC/ ±2%	Three	60, 50	25kVA	No	3%	70 x 20 x 32	1,400	65	32°F-104°F/95%	—	Not available
Nippon Electric Industry Co. **(415) 964-0977**	.5kVA-100kVA	Mini UPS Series 3000 (3kVA)	On-line	None	120, 220V AC/ ±15%	120, 220V AC/ ±2%	Single	50, 60	3kVA	Yes, 15 min	5%	27.5 x 23.6 x 17.7	507	50	0°C-45°C/95%	—	Not available
Nova Electric, Inc. **(201) 661-3434**	1-15kVA	Galaxy	On-line	None	Any voltage/ ±10%	Any voltage/ ±1%	Single	50, 60	3kVA	No	3%	8.75 x 19 x 21.25	155	55	0°C-55°C/95%	30,000	$4,995
	—	Three Phase UPS	On-line	None	Any voltage/ ±10%	Any voltage/ ±1%	Three	50, 60	30kVA	No	5%	76 x 60 x 30	2,700	60	-20°C-40°C/ 95%	30,000	$30,360
Savin Electronics, Inc. **(914) 632-5577**	200VA-30kVA	UPS 103-16	On-line	None	120, 208V AC/ ±10%	120, 208V AC/ ±1%	Single	50, 60	10kVA	No	5%	75 x 36.5 x 26.5	1,320	6	32°F-113°F/95%	1 year	$17,000
	—	UPS 303-36	On-line	None	120, 208V AC/ +10%,-15%	120, 208V AC/±1%	Three	50, 60	30kVA	No	5%	75 x 36.5 x 26.5	2,500	60	32°F-113°F/95%	1 year	$30,000
Staco Energy Products, Inc. **(513) 253-1191**	300VA-30kVA	First Line/UPS-185-602-5	On-line	None	115V AC/ ±15%	115V AC/ ±2%	Single	60	2.5kVA	Yes, 12 min	5%	33.5 x 17.4 x 20	490	50	0°C-40°C/95%	100,000	$7,800
	—	First Line/UPS-333-630-0	On-line	None	208Y, 120V AC/ +10%,-15%	208Y, 120V AC/±1%	Three	60	30kVA	No	5%	66 x 68 x 25	2,400	50	0°C-40°C/95%	150,000	$37,000
Sola, a unit of General Signal Corp. **(312) 439-2800**	400VA-15kVA	UPS 3.0 kVA	On-line	None	120, 208, 240V AC/ +10%, -15%	120, 208, 240V AC/ ±2%	Single	60	3kVA	No	3%	28 x 24 x 25	320	—	1°C-40°C/95%	—	$6,560
	—	UPS 15-20863	On-line	None	120, 208V AC/ +10%, -15%	120, 208V AC/ ±2%	Three	60	15kVA	No	3%	70 x 27. 2 x 30.2	1,100	—	0°C-40°C/95%	—	$22,750
	—	UPS 15 kVA	On-line	None	120V AC/ +10%, -20%	120V AC/ ±5%	Single	60	15kVA	No	3%	50 x 96 x 20	2,500	—	0°C-50°C/95%	—	$19,000
Teledyne Big Beam Corp. **(815) 459-6100**	400VA-25kVA	Powerdyne 4/2K	On-line	None	120V AC/ ±15%	120V AC/ ±2%	Single	60	3kVA	Yes, 90 min	3%	48.5 x 42.2	—	120	—	20,000	Not available
	—	Powerdyne 4/25K	On-line	None	240V AC/ ±15%	240V AC/ ±2%	Single	60	25kVA	Yes, 90 min	3%	68.5 x 40 x 24	—	120	—	20,000	Not available
Topaz, Inc. **(619) 279-0831**	400VA-15kVA	Powermaker UPS for Microcomputers/2.5K	Standby	One	120V AC/ ±20%	120V AC/ +6%, -8%	Single	60	2.5kVA	Yes, 15 min	5%	23 x 9.5 x 26.6	288 or 388	40	0°C-40°C/95%	10 years	$4,450
	—	Powermaker E/S	On-line	None	120, 208, 240V AC/ +110%, -85%	120, 240V AC/—	Three phase in, single phase out	60	15kVA	Yes, 10 min	4%	52 x 40 x 30	2,250	55	0°C-40°C/ 95%	—	$25,000
Toshiba Corp. **(713) 466-0277**	—	Tosnic-u-1100 UPS	On-line	None	120V AC/ +10%,-15%	120V AC/ ±3%	Single	60	2kVA	Yes, 10 min	3%	652mm x 250mm x 672mm	95kg	55	0°C-40°C/30%-80%	—	Not available

Micro uninterruptible power supplies

COMPANY	KVA RANGE FOR TOTAL PRODUCT LINE	PRODUCT	ON-LINE OR STANDBY	RESPONSE INTERVAL (msec)	INPUT VOLTAGE/TOLERANCE	OUTPUT VOLTAGE/ TOLERANCE	PHASE	FREQUENCY (Hz)	POWER RATING (kVA)	BUILT-IN BATTERY/ PROTECTION TIME	TOTAL HARMONIC DISTORTION OF SINE WAVE OUTPUT	SIZE (height, width, depth in in.)	WEIGHT (lb)	NOISE LEVEL (db)	TEMPERATURE/RELATIVE HUMIDITY REQUIREMENTS	MEAN TIME BETWEEN FAILURES (hours)	PRICE
Abacus Controls, Inc. (201) 526-6010	300VA-30kVA	UPS-4	Standby	2	120V AC/ ±10%	120V AC/ ±2%	Single	60	1.2kVA	Yes, 15-20 min	2%	11.5 x 7.7 x 14.5	71	Inaudible	-20°C-45°C/95%	70,000	$1,395
	—	UPS 932-4	Standby	4	120V AC/ ±10%	117V AC/ ±5%	Single	60	3kVA	Yes, 15 min	5%	6.6 x 4.7 x 14.2	21	Inaudible	0°C-45°C/95%	75,000	$595
Advance Conversion Devices Co. (201) 989-0095	—	U-13/14	On-line	None	120V AC/ ±10%	120V AC/ ±2%	Single	60	36VA	No	6%	6.5 x 11 x 11	20	—	-40°C-50°C/ 100%	50,000	$719-$785
Advanced Electronic Systems, Inc. (717) 263-5681	—	SWD 450	Standby	4	120V AC/No tolerance available	117V AC/ ±6%	—	60	.45kVA	Yes, 7-15 min	NA	6.4 x 4.6 x 15.6	26	Inaudible	—	6-8	$795
		SWD 750	Standby	4	120V AC/No tolerance available	117V AC/±6%	—	60	.75kVA	Yes, 7-15 min	NA	8.6 x 7.2 x 17.3	45	Inaudible	—	6-8	$995
Alpha Technologies, Inc. (206) 647-2360	.3kVA-3kVA	Alpha 1500	NA (ferroresonant)	None	120, 240V AC/ ±15%	120, 240V AC/ ±3%	Single	50, 60	1.5kVA	Yes, 40 min-4 hours	5%	35 x 20.5 x 28	435	—	0°C-120F/—	—	$3,600
		Alpha 300	NA (ferroresonant)	None	120, 240V AC/ ±15%	120, 240V AC/ ±3%	Single	50, 60	.3kVA	Yes, 30 min-2 hours	5%	7.5 x 16.3 x 14.1	65	40	—	—	$595
American Monarch Corp. (612) 788-9161	125VA-1kVA	AM-0125	Standby	2	120V AC/—	120V AC/ +5%, -10%	Single	50, 60	125VA	Yes, 10 min	NA	5.25 x 4.4 x 12.75	18	Inaudible	0°C-40°C/95%	—	$395
	—	AM-1000	Standby	2	120V AC/—	120V AC/ +5%, -10%	Single	50, 60	1kVA	Yes, 10 min	NA	5.25 x 17.5 x 12.75	59	Inaudible	0°C-40°C/95%	—	$1,080
Applied Technology, Inc. (404) 951-9556	1.5kVA	Copilot	On-line	NA	90-240 V AC/ ±30%	All IBM standard bus voltages and control signals/ ±11%	NA	NA	Equivalent to 1.5kVA	2	NA	2.7 x 14.5 x 16	35	Inaudible	None	—	$1,495
Avionic Instruments, Inc. (201) 388-3500	—	8A 1000	On-line	None	115, 220V AC/ ±20%	115V AC/ ±1%	Both	50, 60	1kVA	No	0.5%	19 x 19 x 12.21	73	45	0°C-55°C/95%	—	$7,500
Best Power Technology, Inc. (608) 565-7200	250VA-15kVA	M250VA	On-line	None	120V AC/ +10%, -20%	120V AC/ 3%	Single	60	.25kVA	Yes, 50 min	5%	17 x 8.2 x 20	61 (without battery)	44	0°C-40°C/95%	65,000	$1,095
	—	M1500VA	On-line	None	120V AC/ +10%, -20%	120V AC/ 3%	Single	60	1.5kVA	Yes, 20 min	5%	18 x 12.4 x 29	129 (without battery)	47	0°C-40°C/95%	65,000	$3,995
C-Cor Electronic, Inc. (814) 238-2461	300VA-1kVA	Power Vision 300	Standby	4	115V AC/ ±10%	115V AC/ ±3%	Single	60	.3kVA	Yes, 10 min	5%	6.3 x 12 x 17	44	55	0°C-40°C/90%	20,000	$499
	—	Power Vision 1000	Standby	4	115V AC/ ±10%	115V AC/ ±3%	Single	60	1kVA	Yes, 10 min	5%	21 x 11 x 20	128	60	0°C-40°C/90%	—	$1,199
Clary Corp. (818) 287-6111	360VA-37.5kVA	Onguard PC 2400	On-line	None	120 or 220V AC/ +10%, -30%	120 or 220V AC/ ±2.5%	Single	50, 60	.75kVA	Yes, 12-24 min	5%	9.8 x 5.9 x 15.75	39.5	43	0°C-40°C/90%	50,000	$1,390
	—	Onguard PC 1240	On-line	None	120 or 220V AC/ +10%, -30%	120 or 220V AC/ ±2.5%	Single	50 or 60	.36kVA	Yes, 5-15 min	5%	1.9 x 15.75 x 15	20	45	0°C-40°C/90%	59,000	$890
Computer Accessories Corp. (619) 457-5500	400VA-1,000VA	Power Saver 400	Standby	4	120V AC/ ±15%	120V AC/ ±3%	Single	60	.4kVA	Yes, 10 min	7%	15 x 7 x 18	48	10K	0°C-40°C/95%	89,000	$749.95
	—	Power Saver 1000	Standby	4	120V AC/ ±15%	120V AC/ ±3%	Single	60	1kVA	Yes, 10 min	7%	—	71.5	10K	0°C-40°C/95%	89,000	$1,099.95
Computer Power, Inc. (201) 638-8000	400VA-600kVA	Defender	Standby	2-4	120V AC/ +10%, -15%	120V AC/ +2%, -2%	Single	50, 60	.4kVA	Yes, 10 min	5%	13 x 6.5 x 13	44	40	32F°-120F°/95%	—	$650
	—	Computersave	On-line	None	120V AC/ ±10%	120V AC/ ±2%	Single	50, 60	1.5kVA	Yes, 7 min	5%	12.5 x 12.5 x 21	150	51	32°F-120°F/95%	—	$2,495
Computer Products, Boschert, Inc. (408) 942-1600	.2kVA	Powersafe	On-line	None	115V AC/ ±15%;	5DC/±5%; 12DC/ ±5%; -12DC/ ±10%; -5DC/ ±10%; 120V AC/—	Single	50, 60	.2kVA	Yes, 5 min	NA	8.2 x 5.5 x 4.5	10.5	—	0°C-40°C/5%-80%	50,000	$550
Control Technology, Inc. (405) 840-3163	.3kVA-1.5kVA	RBS-AC300	Both	1	120, 240V AC/ ±10%	120V AC/ ±3%	Single	50, 60	.3kVA	Yes, 8-10 min	5%	5.4 x 13.4 x 11.75	28	Inaudible	0°C-40°C/95%	10,000	$549
	—	RBS-AC1500	Standby	1	120, 240V AC/ ±10%	120V AC/ ±2%	Single	50, 60	1.5kVA	Yes, 8 min	5%	11 x 13.4 x 11.75	70	Inaudible	0°C-40°C/95%	10,000	$1,499
Controlled Power Co. (800) 521-4792	400VA-15kVA	Series 110	Standby	2	120V AC/-10%	120V AC/ ±2%	Single	60	400VA	Yes, 30 min	5%	16 x 8 x 9	90	Less than 20 or 90	0°C-40°C/98%	200,000	$855
	—	Series 110/ 1.2kVA	Standby	2	120V AC/-10%	120V AC/ ±2%	Single	60	1.2kVA	Yes, 7 min	5%	16 x 8 x 9	110	Less than 20 or 90	0°C-40°C/98%	200,000	$1,455

The companies included in this chart responded to a recent telephone survey conducted by *Computerworld*. Further product information is available from the vendors.

COMPANY	KVA RANGE FOR TOTAL PRODUCT LINE	PRODUCT	ON-LINE OR STANDBY	RESPONSE INTERVAL (msec)	INPUT VOLTAGE/TOLERANCE	OUTPUT VOLTAGE/ TOLERANCE	PHASE	FREQUENCY (Hz)	POWER RATING (kVA)	BUILT-IN BATTERY/ PROTECTION TIME	TOTAL HARMONIC DISTORTION OF SINE WAVE OUTPUT	SIZE (height, width, depth in in.)	WEIGHT (lb)	NOISE LEVEL (db)	TEMPERATURE/RELATIVE HUMIDITY REQUIREMENTS	MEAN TIME BETWEEN FAILURES (hours)	PRICE
Cuesta Systems Corp. **(805) 541-4160**	.09kVA-.4kVA	Datasaver 400W UPS	Standby	2-8	117V AC/ +10%, -12%	117V AC/ +10%, -12%	Single	50, 60	.4kVA	Yes, 5 min	NA	2 x 13 x 13	28	40	0°C-40°C/95%	—	$695
	—	Datasaver 200W UPS	Standby	2-8	117V AC/ +10%, -12%	117V AC/ +10%, -12%	Single	50, 60	.2kVA	Yes, 5 min	NA	4 x 6 x 9	15	40	0°C-40°C/95%	—	$495
Decision Data Computer Corp. **(215) 674-3300**	200VA-30kVA	5900-1	Standby	4	120V AC/—	120V AC/—	Single	60	.2kVA	Yes, 15-20 min	5%	6 x 8 x 14.5	29	55	—	—	$410
	—	5900-04	Standby	4	120V AC/—	120V AC/—	Single	60	1.7kVA	Yes, 15-20 mins	5%	8.5 x 20.2 x 15.5	178	55	—	—	$1,900
Deltron, Inc. **(215) 699-9261**	400VA-5kVA	Series FL/04	Standby	4	120V AC/ +10%, -15%	120V AC/ ±3%	Single	60	400VA	Yes, 10 min	5%	13x6.5x13	44 (including battery)	40-55	0°C-50°C/95%	—	$645
	—	Series FL/15	Standby	4	120V AC/ +10%, -15%	120V AC/ ±3%	Single	60	1.5kVA	Yes, 8 min	5%	7 x 17 x 20	118	40-55	0°C-50°C/95%	—	$1,545
Displex, Inc. **(516) 671-4400**	1kVA-6.25kVA	PSV 7511	On-line	None	120V AC/ ±20%	120V AC/ ±2%	Single	60	1kVA	Yes, 10-20 min	5%	22 x 18 x 15	220 (with battery)	50	0°C-40°C/95%	55,000	$3,085
Electro Vector, Inc. **(707) 887-2292**	250VA-1kVA	SRP-250	Standby	1	115V AC/ ±15%	115V AC/ ±15%	Single	50, 60	.25kVA	Yes, 10 min	1%	6.5 x 12.5 x 14.8	43	20	10°C-40°C/95%	—	$903
	—	SRP-1000	Standby	1	115V AC/ ±15%	115V AC/ ±15%	Single	50, 60	1kVA	Yes, 30 min	1%	13.5 x 18.6 x 12.5	155	20	10°C-40°C/95%	—	$1,700
Electronic Protection Devices, Inc. **(800) 343-1813**	500VA-3kVA	Grizzly	Standby	2	115V AC/ ±5%	115V AC/ ±5%	Single	60	.5kVA	Yes, 10 min	NA	6 x 13 x 5	50	—	0°C-40°C/95%	—	$800
	—	Grizzly 1K	Standby	2	115V AC/ ±5%	115V AC/ ±5%	Single	60	1kVA	Yes, 15 min	NA	8 x 11 x 21	100	—	0°C-40°C/95%	—	$1,300
Electronic Specialists, Inc. **(800) 225-4876**	.25kVA-.5kVA	Sine Ups	On-line	None	110V AC/ ±20%	115V AC/ ±5%	Single	60	.25kVA	Yes, 11 min	5%	10 x 9 x 17	65	35	0°C-28°C/80%	—	$1,095
	—	Sine Ups-500	On-line	None	110V AC/ ±20%	115V AC/ ±5%	Single	60	.5kVA	Yes, 11 min	5%	10 x 9 x 17	95	35	0°C-28°C/80%	—	$1,495
Elgar Corp. **(619) 450-0085**	400VA-1.5kVA	IPS 1600	Standby	4	120V AC/ +10%, -15%	120V AC/—	Single	60	1.5kVA	Yes, 5-41 min	5%	17 x 15 x 11	110	—	0°C-40°C/95%	—	NA
	—	IPS 400/600	Standby	4	120V AC/ +10%, -15%	120V AC/—	Single	60	.4kVA	Yes, 5-45 min	5%	2.3 x 15 x 15	25	—	0°C-40°C/95%	—	NA
Emergency Power Engineering, Inc. **(714) 557-1636**	250VA-80kVA	FPS-1000	Standby	6-10	120V AC/ ±30%	120V AC/ ±3%	Single	60	.25kVA	Yes, 50 min	5%	17 x 8.2 x 20	100	44	32°F-104°F/95%	57,000	NA
	—	FPS-1000	Standby	6-10	120V AC/ ±30%	120V AC/ ±3%	Single	60	1.5kVA	Yes, 20 min	5%	18 x 12.4 x 29	225	47	32°F-104°F/95%	57,000	NA
Emerson Electric Corp. **(714) 545-5581**	.2kVA-750kVA	AP1000/-.2kVA	Standby	4	120, 220, 240V AC/ +10%, -15%	120, 220, 240V AC/ ±5%	Single	50, 60	.2kVA	Yes, 15 min	5%	6 x 8 x 14.5	29 (with battery)	65	0°C-40°C/95%	—	$425
	—	AP1000/-1.5kVA	Standby	4	120, 220, 240V AC/ +10%, -15%	120, 220, 240V AC/ ±15%	Single	50, 60	1.5kVA	Yes, 15 min	50%	8.5 x 20.5 x 15.5	178 (with battery)	65	0°C-40°C/95%	—	$1,999
Exide Electronics, Inc. **(919) 872-3020**	1.5kVA-8,000kVA	1101	On-line	None	120V AC/ +13%, -20%	120V AC/ ±2%	Single	60	1.5kVA	Yes, 15 min	3%	37.5 x 17 x 26	370	50	10°C-40°C/95%	100,000	$4,310
General Power Systems, Inc. **(714) 956-9321**	500VA-50kVA	GPS MGII/ .5kVA	Standby	2	115V AC/ ±10%	115V AC/ ±5%	Single	50, 60	.5kVA	Yes, 10 min	NA	5.9 x 13.3 x 16.5	48	—	0°C-40°C/95%	50,000	$895
	—	GPS MGII/ 1kVA	Standby	2	115V AC/ ±10%	115V AC/ ±5%	Single	50, 60	1kVA	Yes, 15 min	NA	7.8 x 11.1 x 21.5	98	—	0°C-40°C/95%	50,000	$1,295
Imunelec, Inc. **(516) 364-8008**	.3kVA-140kVA	MS 300	On-line	None	120V AC/ ±15%	120V AC/ ±2%	Single	60	.3kVA	Yes, 15 min	5%	5 x 15 x 11	38	39	32°F-86°F/90%	40,000	$1,050
	—	Series 11-1.5	On-line	None	120V AC/ +10%, -15%	120V AC/ ±1%	Single	60	1.5kVA	Yes, 15 min	5%	41 x 22 x 22	232	45	32°C-105°C/95%	45,000	$5,357
Kalglo Electronics, Inc. **(800) 524-0400**	250VA-750VA	Line-Saver	Standby	2	120, 230V AC/—	120V AC/ ±10%	Single	50, 60	.25kVA	Yes, 15-20 min	—	4.75 x 6.75 x 9.25	17	—	0°C-40°C/90%	60,000	$549
		Line-Saver/ 750VA	Standby	2	120, 230V AC/—	120V AC/ ±10%	Single	50, 60	.75kVA	Yes, 15-20 min	—	5 x 8.5 x 13.25	38	—	0°C-40°C/90%	60,000	$995
Liebert Corp. **(614) 888-0246**	200VA-4000kVA	Liebert Single Phase UPS	On-line	None	120, 208, 240V AC/ ±15%	120, 208, 240V AC/ ±2%	Single	50, 60	1kVA	Yes, 18 min	3%	25 x 23 x 24	320	45	32°F-104°F/95%	—	NA
	—	Liebert PC-ET	On-line	None	102-130V AC/—	120V AC/ ±5%	Single	60	.2kVA	Yes, 10-15 min	5%	2.3 x 15 x 14.8	23	47	32°F-95°F/90%	—	NA
Meirick, Inc. **(303) 668-3251**	.4kVA-.8kVA	MI 400/400 LB	Standby	3	115V AC/ ±15%	115V AC/ ±5%	Single	60	.4kVA	Yes, 8-16 min	NA	4 x 9 x 12	17, 24	—	0°F-110°F/non-dewpoint	5 years	$449-$495
	—	MI 800	Standby	3	115V AC/ ±15%	115V AC/ ±5%	Single	60	.8kVA	Yes, 8-16 min	NA	4 x 9 x 12	—	—	0°F-110°F/non-dewpoint	5 years	$795
Nippon Electric Industry Co. **(415) 964-0977**	.5kVA-100kVA	Mini UPS MUD 0500 series (.5kVA)	On-line	None	120V AC/ ±15%	120, 220V AC/ ±2%	Single	50, 60	.5kVA	Yes, 15 min	5%	7.9 x 11.8 x 15.7	63.9	45	0°C-45°C/95%	—	NA
	—	Mini UPS MUD 1000 series (1 kVA)	On-line	None	120V AC/ ±15%	120, 220V AC/ ±2%	Single	50, 60	1 kVA	Yes, 15 min	5%	7.9 x 15.7 x 19.7	104	45	0°C-45°C/95%	—	NA
Nova Electric, Inc. **(201) 661-3434**	1kVA-15kVA	Galaxy-1kVA	On-line	None	120, 220V AC/ ±10%	120, 220V AC/ ±1%	Single	50, 60	1kVA	No	3%	7 x 19 x 21	70	50	0°C-55°C/95%	30,000	$2,000-$5,000

COMPANY	KVA RANGE FOR TOTAL PRODUCT LINE	PRODUCT	ON-LINE OR STANDBY	RESPONSE INTERVAL (msec)	INPUT VOLTAGE/TOLERANCE	OUTPUT VOLTAGE/ TOLERANCE	PHASE	FREQUENCY (Hz)	POWER RATING (kVA)	BUILT-IN BATTERY/ PROTECTION TIME	TOTAL HARMONIC DISTORTION OF SINE WAVE OUTPUT	SIZE (height, width, depth in in.)	WEIGHT (lb)	NOISE LEVEL (db)	TEMPERATURE/RELATIVE HUMIDITY REQUIREMENTS	MEAN TIME BETWEEN FAILURES (hours)	PRICE
Ohm Electronics Corp. **(312) 359-6040**	.5kVA-.25kVA	SPS 500 AT	Standby	2	115V AC/ +15%, -10%	120V AC/ +15%, -10%	Single	60	.5kVA	Yes, 12 min	—	6 x 10.7 x 12.25	40 (with battery)	—	0°C-50°C/95%	—	$749
	—	SPS 250 XT	Standby	4	115V AC/ +15%, -10%	120V AC/ +15%, -10%	Single	60	.25kVA	Yes, 10-15 min	—	4.75 x 9.5 x 13.3	25	—	0°C-50°C/95%	—	$279
Para Systems, Inc. **(800) 238-7272**	.25kVA-1.6kVA	Minuteman 250	Standby	4	110V AC/ ±15%	115V AC/ ±5%	Single	60	.25kVA	Yes, 7 min	5%	10.5 x 6.8 x 4.8	22	—	0°C-40°C/95%	—	$359
	—	Minuteman 1600 SS	Standby	1	110V AC/ ±15%	115V AC/ ±5%	Single	60	1.6kVA	Yes, 10 min	5%	17.8 x 12.4 x 7.1	58	—	0°C-40°C/95%	—	$1,999
Perma Power Electronics, Inc. **(800) 323-4255**	.3kVA-1kVA	SPS 300	Standby	0.75	120V AC/—	117V AC/ ±4%	Single	60	.3kVA	Yes, 8 min	NA	6 x 8 x 13	28	—	—	—	$599
	—	SPS 1000	Standby	0.75	120V AC/—	117V AC/ ±4%	Single	60	1kVA	Yes, 8 min	NA	6 x 8 x 22	67	—	—	—	$1,299
Power Control, Inc. **(716) 855-2000**	400VA-1500VA	Standby Power System ME 400	Standby	2	120, 220V AC/ ±10%	120, 220V AC/ ±5%	Single	50, 60	.4kVA	Yes, 10 min	NA	4 x 9 x 12	15	Inaudible	0°C-40°C/100%	4-5 years	$450
	—	Standy Power System ME 1500	Standby	2	120, 220V AC/ ±10%	120, 220V AC/ ±5%	Single	50, 60	.8kVA	Yes, 10 min	NA	4 x 9 x 12	25	Inaudible	0°C-40°C/100%	4-5 years	$800
Preferred Electronics, Inc. **(413) 568-2301**	250VA-1,000VA	Surgio P200	On-line	None	115V AC/ ±10%	115V AC/ ±5%	Single	50, 60	.25kVA	Yes, 30 min	1%	5.5 x 10.5 x 16.5	30	40	10°C-50°C/95%	65,000	$750
	—	Surgio P1000	On-line	None	115V AC/ ±10%	115V AC/ ±5%	Single	50, 60	1kVA	Yes, 30 min	—	14.5 x 10.5 x 16.5	80	40	10°C-50°C/95%	65,000	$2,250
PTI Industries, Inc. **(408) 438-0946**	.4kVA-.7kVA	SS400	On-line	None	90-135V AC/—	120V AC/ ±3%	Single	60	.4kVA	Yes, 20-30 min	3%	3 x 18 x 17	32	50	0°C-40°C/85%	—	$995
	—	SS700	On-line	None	90-135V AC/—	120V AC/ ±3%	Single	60	.7kVA	Yes, 20-30 min	3%	3 x 18 x 17	39	50	0°C-40°C/85%	—	$1,199
	—	PC 200 A	Standby	3-6	115V AC/—	120V AC/ ±3%	Single	60	.2kVA	Yes, 15-25 min	5%	4.25 x 7.25 x 13.5	24	50	0°C-40°C/85%	—	$399
	—	AT 1500 A	Standby	4-10	120V AC/—	120V AC/ ±3%	Single	60	1.5kVA	No	5%	9.3 x 12.6 x 16.5	139	50	0°C-40°C/85%	—	$1,899
Safe Power Systems, Inc. **(602) 894-6864**	.25kVA-1.2kVA	Safe 500	Standby	2	105, 132V AC/—	115V AC/ ±3%	Single	60	.5kVA	Yes, 9-25 min	5%	5.25 x 15.5 x 8.5	43	40	0°C-40°C/95%	3 years	$795
	—	Safe 1200/ 1200A	Standby	2-4	105, 132V AC/—	120V AC/ ±3%	Single	60	1.2kVA	Yes, 6-15 min	5%	5.25 x 17 x 15.62	69	40	0°C-40°C/95%	3 years	$1,395-$1,595
Savin Electronics, Inc. **(914) 632-5577**	200VA-30kVA	Micro UPS 206	On-line	None	120V AC/ +10%, -15%	120V AC/ ±1%	Single	50, 60	.2kVA	Yes, 30 min	—	32.3 x 10 x 26.6	88	57	32°F-104°F/95%	1-2 years	$1,250
	—	Micro UPS 1006	On-line	None	120V AC/ +10%, -15%	120V AC/ ±1%	Single	50, 60	1kVA	Yes, 15 min	—	32.3 x 10 x 26.6	198	57	32°F-104°F/95%	1-2 years	$2,650
S. L. Waber, Inc. **(609) 456-5400**	300VA-600VA	Linegard 300	On-line	None	120V AC/ ±10%	115V AC/ ±10%	Single	60	.3kVA	Yes, 30 min	NA	5 x 17 x 17	48	8-50	0°C-40°C/95%	3 years	$995
	—	Linegard 600	On-line	None	120V AC/ ±10%	115V AC/ ±10%	Single	60	.6kVA	Yes, 20 min	NA	5 x 19 x 20	80	8-50	0°C-40°C/95%	3 years	$1,495
Sola, a unit of General Signal **(312) 439-2800**	400VA-15kVA	Mini UPS	On-line	None	120V AC/ +10%, -15%	120V AC/ ±3%	Single	60	.4kVA	Yes, 20 min	3%	10.5 x 12 x 19	125	—	0°C-40°C/95%	—	$1,716
	—	UPS 1.5kVA	On-line	None	120V AC/ +10%, -15%	120V AC/ ±2%	Single	60	1.5kVA	No	3%	8.75 x 17 x 26	185	—	0°C-40°C/95%	—	$4,856
Staco Energy Products, Inc. **(513) 253-1191**	300VA-30kVA	First Line/SPS-111-600-3	Standby	4	120V AC/ ±10%	120V AC/ ±5%	Single	60	.3kVA	Yes, 15 min	3%	5.5 x 12 x 16	36	50	0°C-40°C/90%	120,000	$439
	—	First Line/111-601-0	Standby	4	120V AC/ ±10%	120V AC/ ±5%	Single	60	1.kVA	Yes, 8 min	3%	11 x 12 x 16	80	50	0°C-40°C/90%	120,000	$995
	—	First Line/UPS-111-401-2	On-line	None	120V AC/ +10%, -15%	120V AC/ ±2%	Single	60	1.2kVA	Yes, 10 min	3%	1.5 x 9.5 x 28.5	136	50	0°C-40°C/90%	120,000	$3,920
	—	First Line/UPS-111-400-6	On-line	None	120V AC/ +10%, -15%	120VAC/ ±2%	Single	60	.6kVA	Yes, 3 min	3%	16.5 x 9.5 x 28.5	130	50	0°C-40°C/90%	120,000	$2,350
Teledyne Big Beam Corp. **(815) 459-6100**	400VA-25kVA	Powerdyne 4/1.2K	Standby	2	120V AC/ ±10%	120V AC/ ±7%	Single	60	1.2kVA	Yes, 5 min	3%	—	75	—	0°C-40°C/—	—	NA
	—	Powerdyne 4	Standby	2	120V AC/ ±10%	120V AC/ ±7%	Single	60	.4kVA	Yes, 15 min	3%	6 x 8 x 11.5	23	—	0°C-40°C/—	—	$650
Topaz, Inc. **(619) 279-0831**	400VA-15kVA	Powermaker Micro UPS/ 400VA	Standby	4	120V AC/ +10%, -15%	120V AC/ ±3%	Single	50, 60	.4kVA	Yes, 35 min	7%	15 x 7 x 18	66.5	40	0°C-40°C/95%	89,000	$860
	—	Powermaker Micro UPS/ 1.3kVA	Standby	4	120V AC/ +10%, -15%	120V AC/ ±3%	Single	50, 60	1.3kVA	Yes, 8 min	7%	15 x 7 x 18	90	40	0°C-40°C/95%	89,000	$1,490
Ulveco Electronics, Inc. **(415) 574-1100**	500VA-1kVA	Micro UPS 500	On-line	None	220, 120, 240V AC/—	220, 120, 240V AC/ ±2%	Single	50, 60	.5kVA	Yes, 15 min	5%	24.5 x 8.8 x 10.2	77	Inaudible	0°C-40°C/95%	—	$2,135-$2,195
	—	Micro UPS 1000	On-line	None	220, 120, 240V AC/—	220, 120, 240V AC/ ±2%	Single	50, 60	1kVA	Yes, 15 min	5%	21.6 x 9.8 x 23.6	132	Inaudible	0°C-40°C/95%	—	$3,135-$3,195

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COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

"...We're trying to reach MIS and data communications professionals. And Computerworld effectively delivers both."

— Tom McGovern
Vice President/Sales & Marketing
Datagram Corporation

Datagram Corporation of East Greenwich, Rhode Island manufactures and markets STEAMER, a data compressor that allows user organizations to cut their number of communications lines by up to 67 percent. And at least one customer was able to eliminate an entire data center and save $2.5 million a year.

But since true data compressors — and their very real benefits — are not that well known by the user community, Datagram needed to increase awareness of this technology and STEAMER in particular, notes Tom McGovern, Vice President/Sales and Marketing for Datagram.

"Going in, we recognized that we were faced with making a conceptual sale. We knew we'd have to make people aware of the concept of data compression before they'd buy. So our goal was to educate potential users and generate inquiries.

"We chose Computerworld, *quite simply, because my many years of experience with it have shown me what a very effective vehicle it is. For example, we're trying to reach MIS and data communications professionals. And* Computerworld *effectively delivers both. In fact, of the total number of responses generated by* Computerworld, *40 percent come from companies that have datacomm managers.* Computerworld *is a communications book as well as an MIS book.*

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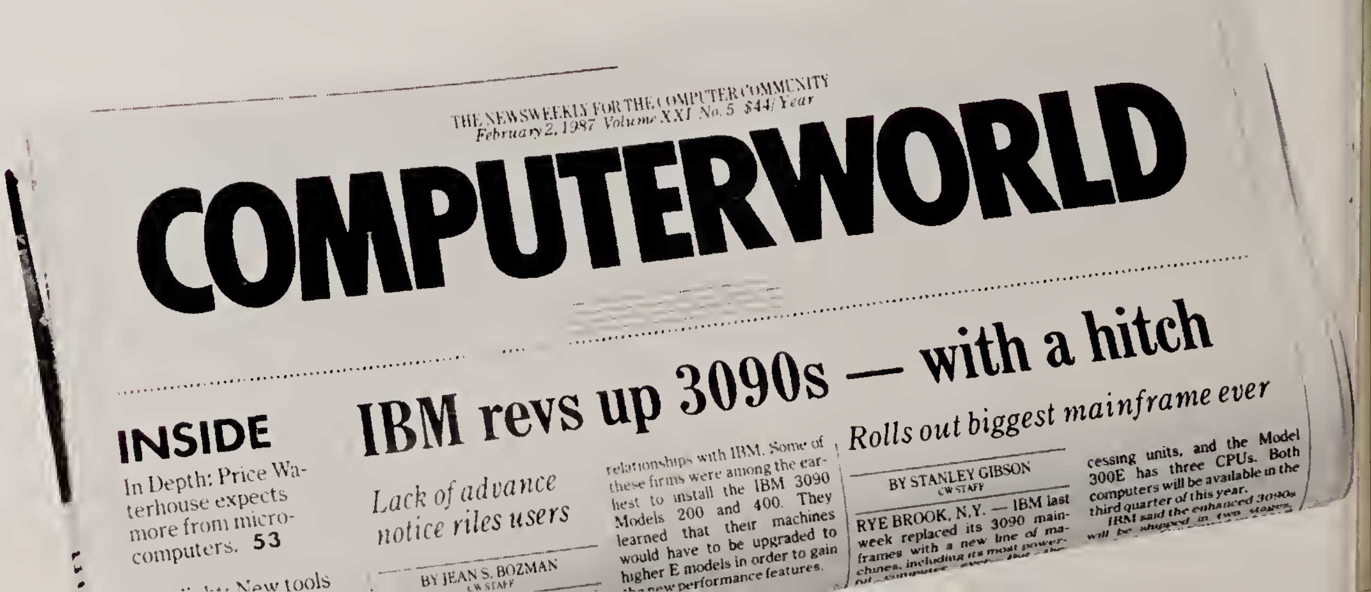

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY
February 2, 1987 Volume XXI No. 5 $44/Year

COMPUTERWORLD

IBM revs up 3090s — with a hitch

Rolls out biggest mainframe ever

INSIDE

In Depth: Price Waterhouse expects more from microcomputers. 53

New tools

Lack of advance notice riles users

BY JEAN S. BOZMAN
CW STAFF

relationships with IBM. Some of these firms were among the earliest to install the IBM 3090 Models 200 and 400. They learned that their machines would have to be upgraded to higher E models in order to gain the new performance features.

BY STANLEY GIBSON
CW STAFF

RYE BROOK, N.Y. — IBM last week replaced its 3090 mainframes with a new line of machines, including its most power-

cessing units, and the Model 300E has three CPUs. Both computers will be available in the third quarter of this year.

IBM said the enhanced 3090s

Computerworld's Forecast '88 issue can help you generate 1988's biggest sales.

Computerworld Forecast '88

ISSUE DATE: JANUARY 4—CLOSE: December 11

Computerworld's **Forecast '88** puts you in touch with an audience of information systems professionals who are concerned about the future. Professionals who want to know how today's trends and technology will change — and impact their information systems in the coming year.

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- Outlook for MVS-XB, VMS v.5 and VM.
- Strategic planning for micros.
- Planning tomorrow's networked enterprise systems.
- Survey results of 100 MIS professionals' capital spending/buying plans.
- Vendor outlook on the cloning of PS/2.
- MIS migration toward OS/2.

This special edition, published as a combined December 28 and January 4 issue, delivers an important look at what today's trends will mean tomorrow. There's no better opportunity to reach the MIS, microcomputing and communications professionals who will generate your biggest 1988 sales.

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Upcoming SPOTLIGHT Issues

Issue	Topic	Ad Closing Date
Dec. 21	Spreadsheets Software	Dec. 4
Jan. 11	Terminals and Terminal Emulation Products	Dec. 24
Jan. 25	LANs	Jan. 8
Feb. 8	DEC-Compatible Software	Jan. 21
Feb. 29	Performance Management/ Capacity Planning	Feb. 12
March 14	DBMS	Feb. 26
March 28	Micro-to-Host-Links	March 11
April 11	PCs (IBM-Compatible) Portables/Laptops	March 28
April 25	TBA	April 8
May 9	Printers	April 22
May 23	Data Communications	May 6

COMPUTER CAREERS

Public utilities power up to MIS

Competition spells high pay, electric opportunities for computer experts

BY MICHAEL BALL
SPECIAL TO CW

Few MIS professionals think of public utility companies as top-paying firms. Yet professionals in the industry say that the number of companies seeking MIS talent and the need for utilities to streamline their operations translates into high salaries.

A recent salary survey, cosponsored by *Computerworld* and the Data Processng Management Association, showed that utilities pay 11% more than the average salary for major vertical markets.

Back to laissez-faire

Recent statewide and regional trends are changing the status of utilities from local monopolies free from the conventional forms of competition to more traditional businesses, according to Jerry Worley, DP supervisor at a Southeastern utility. "We no longer see a long-term future as regulated monopolies," he says. "The new emphasis is on competition."

As a result, MIS shops in utilities are beginning to receive more attention from company management. This new recognition exhibits itself in several ways, including increased pressure to improve the company's overall productivity. Management is showing more appreciation for MIS and placing greater emphasis on obtaining the best people, Worley says.

"We regularly outbid other industries for the same people now," he says. "We're an A- or a B+ in salaries and benefits."

However, Worley says the consequences of still being a semipublic company affect the total salary and benefits package. Basically, there are fewer extraordinary benefits because the public is watching. "There is no company country club and I don't expect one," he says. "We can't even put a volleyball court at one end of the parking lot."

Similar attitudes toward salary were reported elsewhere. In eastern Ohio, "We pretty much have to pay competitive rates to keep good people," says Ron McCaslin, DP manager at Consolidated Natural Gas Service Co. in Independence.

In Oregon, the environment is an incentive, but it is not enough, according to Robert Frentress, computer services manager for Pacific Power and Light. "The company attempts to maintain salaries competitive with the outside, but not to exceed them," he says.

Like any other industry, utility companies must compete with other companies in their regions that require highly skilled MIS professionals. "New York is probably the most competitive market in the country for data processing," says John Scannello, Consolidated Edison Co.'s information processing director. "The financial companies want the best and pay for it, so we have to pay near the top, too."

> "THE FINANCIAL COMPANIES want the best and pay for it, so we have to pay near the top, too."
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> JOHN SCANNELLO
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No sweatshops

Unlike other fields, such as finance, where high pay comes with high pressure, MIS professionals in utilities report less demanding circumstances.

Instead, Worley says, "In utilities the pressure on data processing people depends on the position they occupy in a given company. But in general, the pace is good, people like the company and location. We're fairly stable."

With the exception of certain specialized areas, the requirements for MIS professionals in utilities match those of other industries.

"We look for the same sort of talent as most companies," Worley says, "although we have a few areas that take special knowledge and experience. Certainly, nuclear quality control is a little more difficult."

Likewise at Consolidated Edison, Scannello says, "We are charged with finding better ways of doing things and raising productivity for everyone." That means that few MIS professionals are required to possess specialized skills. In Scannello's shop, those few professionals engaged in nuclear plant simulation are the exception to the norm.

While it may not be the case in all utilities, Scannello reports that his company offers MIS resources to match employee expectation.

"We tend to have the state-of-the-art hardware and software, and our program developers and systems people like that," he says. "There is also a diversity of applications, with a lot of engineering programs as well as financial and other more typical applications." As a result, MIS professionals tend to work in several areas rather than spend years doing the same tasks.

In addition, while utilities are often stereotyped as overly regulated, McCaslin says that the regulations do not dominate the MIS part of the job. "I don't see important differences in the types of work we do in a utility," he says. "We have particular demands because of rate structures and tariffs and the like. We report to many, many agencies, but you could say the same thing about any bank or financial institution."

Prying open the door

The nature of the work and high salaries allow the utilities to maintain low turnover. With few new hires in utility companies, someone unhappy with his current position outside the industry may find it difficult to locate an opening in a local utility.

"We generally have a stable workforce that we supplement from time to time with contract people," Frentress says.

Adds Scannello, "We have been stabilized in head count for the past few years." As the utility follows the trend of upgrading the MIS function, "We trade off our back office people for more applications ones and fire some of the more expensive contractors, but the head count remains the same," he says.

Ball is a free-lance writer based in Boston.

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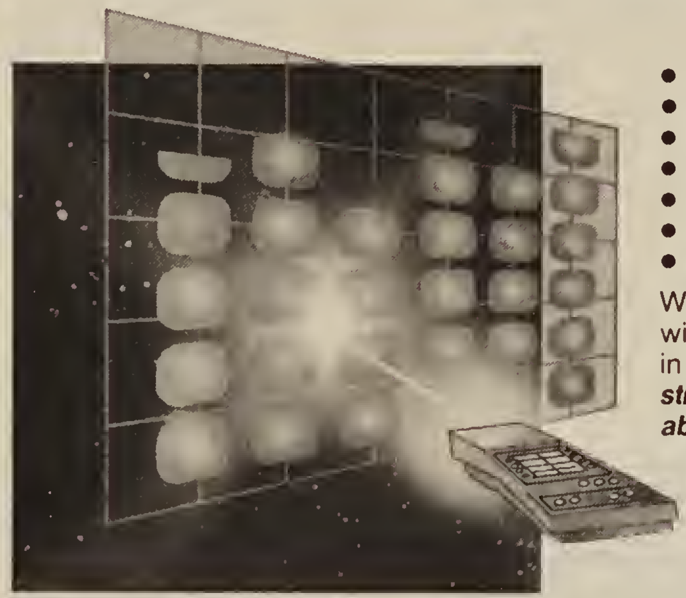

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Lead Market Research Analyst for health care insurance firm in Toledo, OH to provide marketing, sales, advertising, and product management support through advanced identification and planning of research and information needs; design and implement data gathering; analyze data and formulate conclusions and recommendations; make written and oral presentations; act as statistical and research consultant for marketing management, account representatives and group decision makers; manage mainframe and microcomputer hardware and software systems. Marketing information system with recurring reports are generated in the form of software programs by the individual to determine employer's market place posture. Requires Master degree in Business Admin. Must have had 2 graduate level courses providing user experience in microcomputer systems and specifically, with the computer software package statistical Analysis System. 40hr/wk, 8 a.m. to 4:30 p.m. $34,090/yr. Qualified applicants send resume to L. Ellison, JO #3018172, Ohio Bureau of Employment Services, P.O. Box 1618, Columbus, OH 43216.

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Master's degree preferred plus 5 to 6 years experience in programming work or an equivalent combination of education and experience. Technical knowledge and experience with VAX/VMS, UNIX, computer networks (DECnet and TCP/IP) and ALLIN1 desirable.

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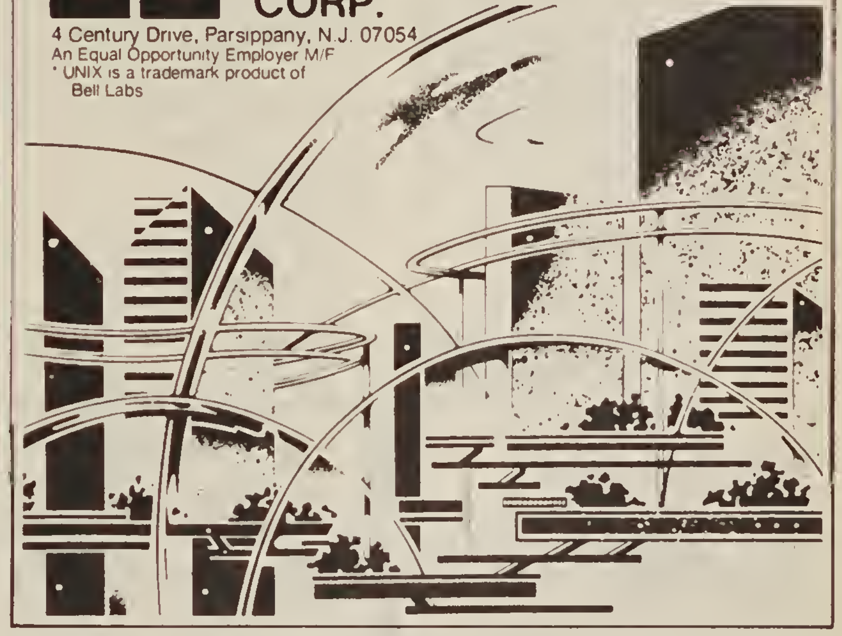

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Master's degree preferred plus 5 to 6 years experience in programming work or an equivalent combination of education and experience. Programming experience should include at least 3 years experience in IBM MVS, MVS/XA and/or VM operating systems programming. Send cover letter and resume to:

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The positions in Corporate Systems require approximately 3 years of COBOL programming with a minimum of 1 year experience with McCormack & Dodge General Ledger or Fixed Assests A working knowledge of CICS and VSAM is desired

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Systems Programmer 3

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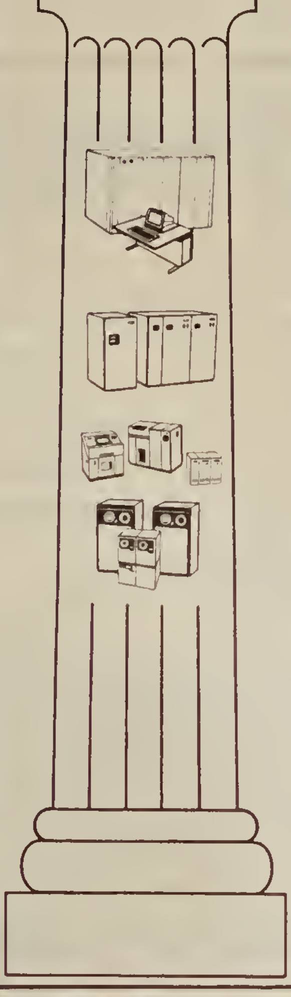

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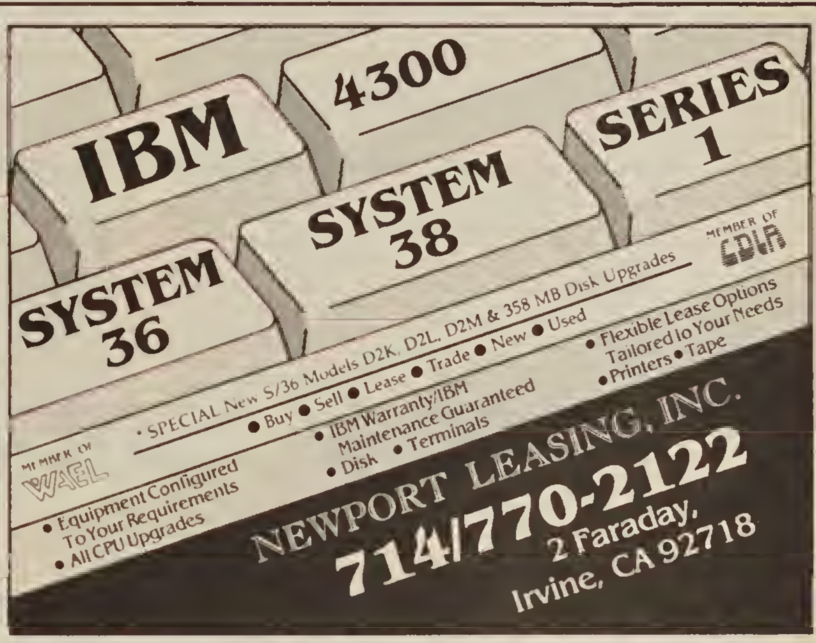

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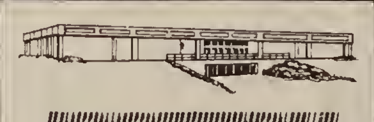

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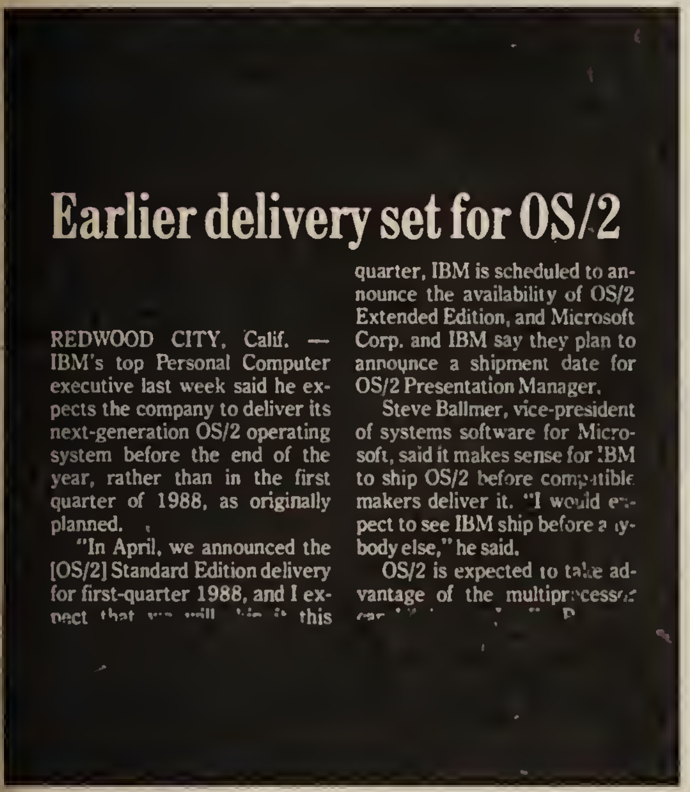


Earlier delivery set for OS/2

REDWOOD CITY, Calif. — IBM's top Personal Computer executive last week said he expects the company to deliver its next-generation OS/2 operating system before the end of the year, rather than in the first quarter of 1988, as originally planned.

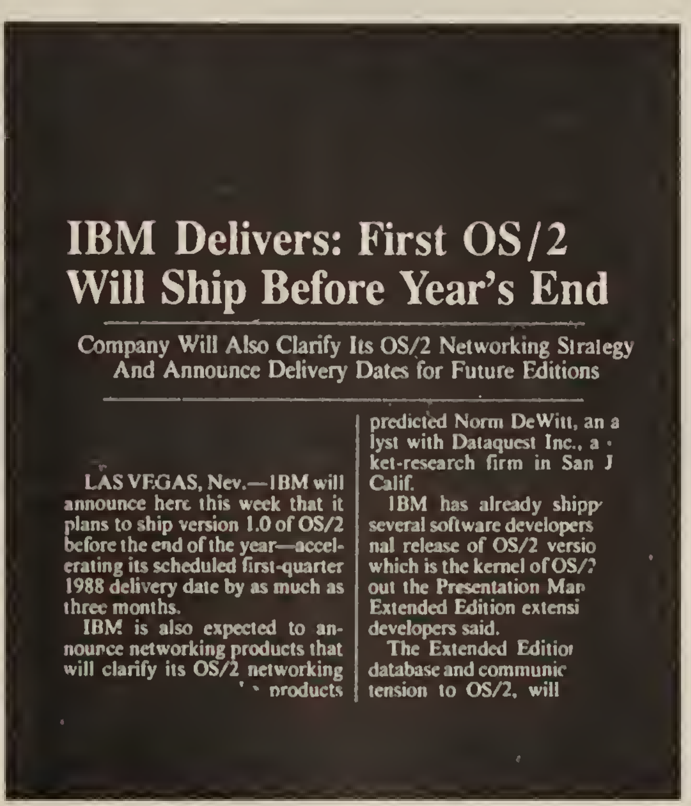
"In April, we announced the [OS/2] Standard Edition delivery for first-quarter 1988, and I expect that we will ship it this quarter, IBM is scheduled to announce the availability of OS/2 Extended Edition, and Microsoft Corp. and IBM say they plan to announce a shipment date for OS/2 Presentation Manager.

Steve Ballmer, vice-president of systems software for Microsoft, said it makes sense for IBM to ship OS/2 before compatible makers deliver it. "I would expect to see IBM ship before anybody else," he said.

OS/2 is expected to take advantage of the multiprocessor

October 26, 1987

PC Week:



IBM Delivers: First OS/2 Will Ship Before Year's End

Company Will Also Clarify Its OS/2 Networking Strategy And Announce Delivery Dates for Future Editions

LAS VEGAS, Nev.—IBM will announce here this week that it plans to ship version 1.0 of OS/2 before the end of the year—accelerating its scheduled first-quarter 1988 delivery date by as much as three months.

IBM is also expected to announce networking products that will clarify its OS/2 networking products

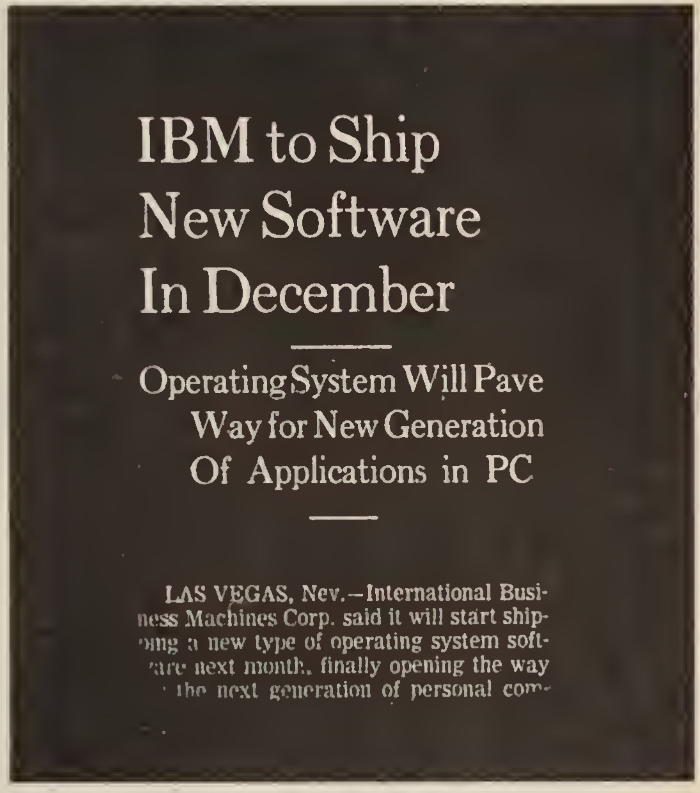
predicted Norm DeWitt, an a lyst with Dataquest Inc., a ket-research firm in San J Calif.

IBM has already shipp several software developers nal release of OS/2 versio which is the kernel of OS/2 out the Presentation Mar Extended Edition extensi developers said.

The Extended Editior database and communic tension to OS/2, will

November 3, 1987

Wall Street Journal:



IBM to Ship New Software In December

Operating System Will Pave Way for New Generation Of Applications in PC

LAS VEGAS, Nev.—International Business Machines Corp. said it will start shipping a new type of operating system soft-are next month, finally opening the way the next generation of personal com-

November 4, 1987

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Mark Potenzone is National Sales Manager for Westinghouse Management Systems Software. This group within Westinghouse markets IBM mainframe productivity enhancement software and operating systems software.

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"We advertised in Computerworld, Computerworld’s SPOTLIGHT *section and* Computerworld’s Card Decks. *And the results from all three were excellent. We’ve seen what advertising in* Computerworld *can do, so there was no surprise there.* SPOTLIGHT *also delivered very pleasing results. Because it is a special pull-out section devoted to one subject, it makes sense that when we advertised in their Network Software issue, we were reaching our customers and potential customers — exclusively.*

"The Card Decks did well for us, too. Those cards are very cost efficient and we got hot responses. If someone is going to take the time to fill one out, then he or she is interested. The result is a qualified lead.

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THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY
February 2, 1987 Volume XXI No. 5 $44/Year

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IBM revs up 3090s — with a hitch

Rolls out biggest mainframe ever

INSIDE
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Lack of advance notice riles users

BY STANLEY GIBSON

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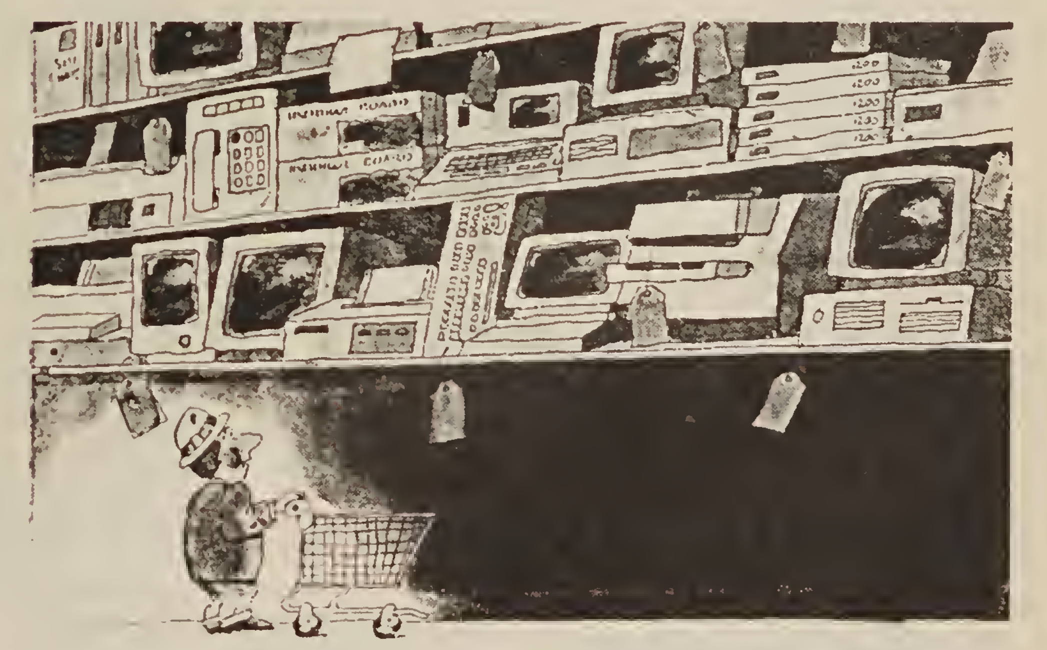

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Jan. 25	LANs	Jan. 8
Feb. 8	DEC-Compatible Software	Jan. 21
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March 14	DBMS	Feb. 26
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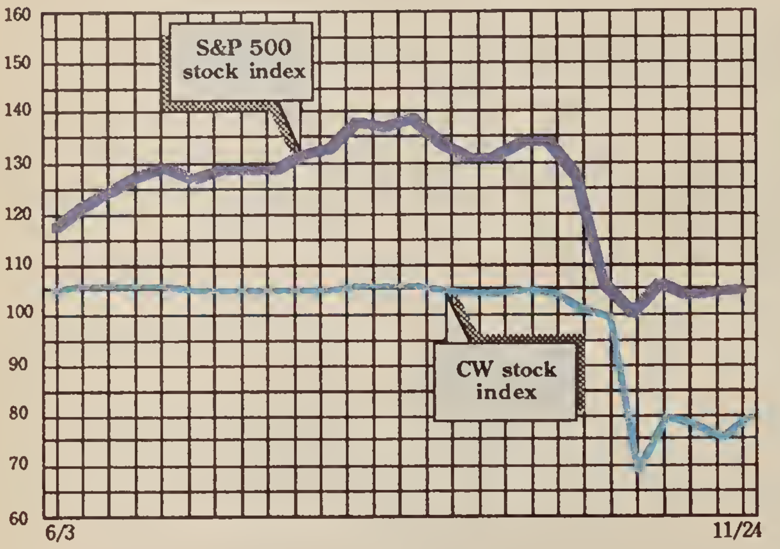

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Semiconductors	51.1	**53.5**
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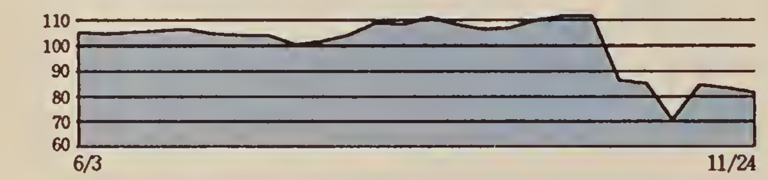
Leasing Companies	88.5	**90.7**
Composite Index	75.5	**78.8**
S&P 500 Index	100.2	**100.5**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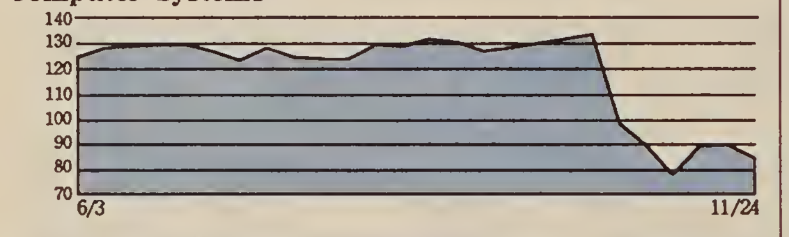
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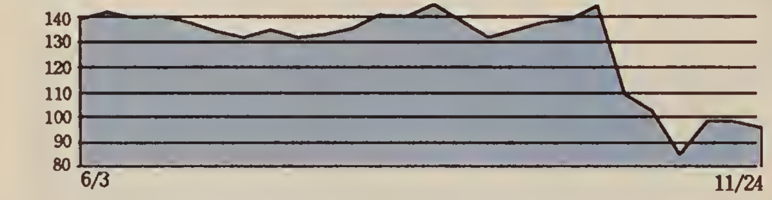
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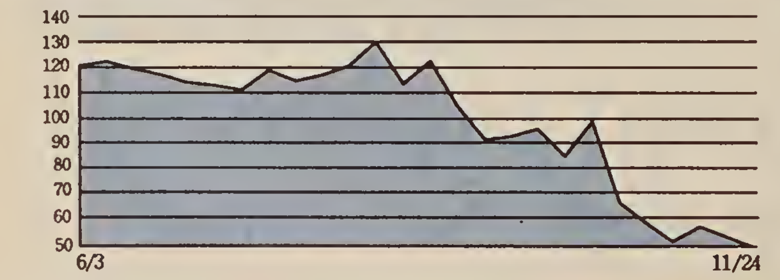
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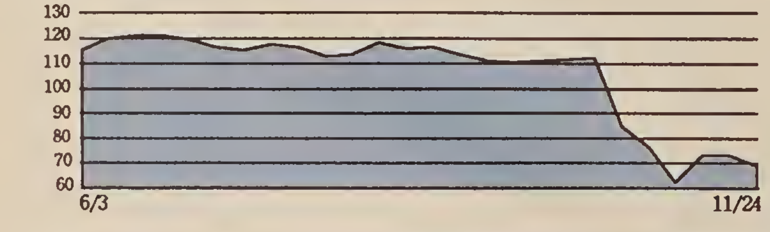
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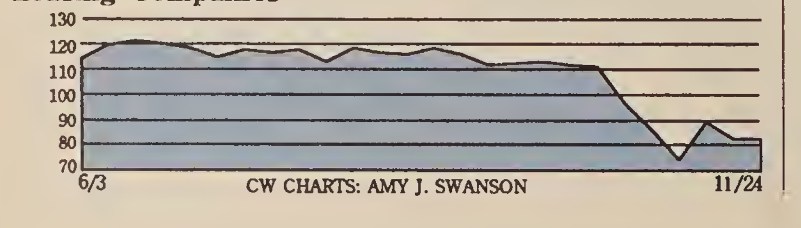
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		52-WEEK RANGE (1)		CLOSE NOV. 25 1987	WEEK NET CHNGE	WEEK PCT CHNGE
N	AMERICAN INFO TECHS CORP	100	74	86.00	0.88	1.03
Q	ANOREW CORP	19	11	11.25	0.25	2.27
Q	ARTEL COMM CORP	5	2	1.75	-0.25	-12.50
N	AT&T	36	20	28.63	0.38	1.33
Q	AVANT GARDE COMP INC	6	2	2.38	-0.25	-9.52
Q	AVANTEK INC	19	7	8.13	-0.50	-5.80
N	AYDIN CORP	38	16	20.00	0.38	1.91
N	BELL ATLANTIC CORP	80	61	68.88	0.75	1.10
N	BELLSOUTH CORP	44	29	38.25	0.75	2.00
Q	FIBRONICS INT	28	12	15.25	0.25	1.67
Q	COMPRESSION LABS INC	8	2	3.13	-0.13	-3.85
O	COMPUTER NETWORK TECH	6	2	2.81	0.38	15.38
O	CONTEL CORP	40	25	29.00	0.50	1.75
Q	DATA SWITCH CORP	9	4	4.88	-0.25	-4.88
Q	DIGITAL COMM ASSOC	49	20	24.50	0.38	1.55
Q	DYNATECH CORP	44	14	19.75	1.00	5.33
Q	EQUATORIAL COMM CO	5	2	3.31	0.19	6.02
Q	GANDALF TECHNOLOGIES	11	5	6.31	0.06	1.01
Q	GENERAL DATACOMM INOS	14	3	4.88	0.00	0.00
N	GTE CORP	45	29	37.38	1.38	3.82
Q	INFOTRON SYS CORP	12	5	5.75	-1.25	-17.86
N	ITT CORP	66	45	47.00	-1.13	-2.34
N	M A COM INC	16	7	9.13	0.00	0.00
Q	MCI COMMUNICATIONS CORP	12	5	9.75	0.13	1.30
Q	MICOM SYS INC	18	7	6.88	0.13	1.85
Q	NETWORK SYS CORP	19	7	8.13	-0.13	-1.52
N	NORTHERN TELECOM LTD	24	14	16.50	0.25	1.54
Q	NOVELL INC	30	12	20.00	2.75	15.94
N	NYNEX CORP	78	58	68.75	1.38	2.04
N	PACIFIC TELESIS GROUP	34	9	27.63	0.50	1.84
N	PARAOYNE CORP	9	4	3.88	-0.13	-3.13
A	PENRIL CORP	6	1	2.13	-0.25	-10.53
N	PLESSEY PLC	41	24	25.50	1.25	5.15
N	SCIENTIFIC ATLANTA INC	20	8	11.38	0.88	8.33
N	SOUTHWESTERN 8ELL CORP	46	22	36.25	0.75	2.11
Q	3 COM CORP	26	12	17.38	0.63	3.73
N	TIMEPLEX INC	41	17	30.25	0.50	1.68
Q	UNGERMANN 8ASS INC	16	6	7.25	0.00	0.00
N	U S WEST INC	60	43	50.50	0.13	0.25

Computer Systems

EXCH		52-WEEK RANGE (1)		CLOSE NOV. 25 1987	WEEK NET CHNGE	WEEK PCT CHNGE
Q	ALLIANT COMPUTER SYS	37	5	6.50	0.00	0.00
Q	ALPHA MICROSYSTEMS	6	3	3.75	-0.25	-6.25
Q	ALTOS COMPUTER SYS	17	9	10.50	0.00	0.00
A	AMDAHL CORP	50	19	31.38	3.63	13.06
Q	APOLLO COMPUTER INC	25	9	11.63	2.13	22.37
Q	APPLE COMPUTER INC	60	19	37.00	2.50	7.25
N	8OLT 8ERANEK & NEWMAN	30	12	14.63	1.00	7.34
Q	8RITTON LEE INC	5	1	1.63	-0.13	-7.14
N	COMPAQ COMPUTER CORP	79	18	49.88	0.50	1.01
Q	COMPUTER AUTOMATION INC	17	3	8.25	-0.50	-5.71
A	COMPUTER CONSOLES INC	12	2	3.38	0.50	17.39
Q	CONCURRENT COMP CORP	24	11	15.25	0.25	1.67
N	CONTROL DATA CORP OEL	38	18	23.25	1.25	5.68
Q	CONVERGENT TECH	12	3	2.88	-0.13	-4.17
Q	CONVEX COMPUTER CORP	22	6	7.88	0.25	3.28
N	CRAY RESH INC	136	47	69.25	1.38	2.03
Q	DAISY SYS CORP	13	5	6.63	-0.25	-3.64
N	OATA GEN CORP	39	16	21.38	-0.38	-1.72
N	DATAPOINT CORP	9	3	5.25	0.50	10.53
N	DIGITAL EQUIP CORP	200	102	128.25	2.75	2.19
N	FLOATING POINT SYS INC	17	4	3.88	-0.13	-3.13
N	GOULD INC	34	8	11.50	-1.00	-8.00
N	HARRIS CORP	43	24	25.13	0.38	1.52
N	HEWLETT PACKARO CO	74	36	52.00	2.38	4.79
N	HONEYWELL INC	91	49	57.50	0.88	1.55
N	I8M	176	102	118.50	2.88	2.49
Q	INFORMATION INTL INC	17	9	9.75	-0.25	-2.50
Q	IPL SYS INC	3	2	2.38	0.13	5.56
Q	MASS COMPUTER CORP	14	6	7.25	0.38	5.45
N	MATSUSHITA ELEC INDL LTD	196	93	167.50	7.00	4.36
Q	MEGAOATA CORP	7	3	3.13	-0.13	-3.85
Q	MENTOR GRAPHICS CORP	39	14	17.25	1.25	7.81
N	NBI INC	14	4	4.75	-0.13	-2.56
N	NCR CORP	87	44	64.25	2.63	4.26
N	PRIME COMPUTER INC	31	12	13.88	-0.25	-1.77
Q	PYRAMIO TECHNOLOGY	12	4	6.00	-0.25	-4.00
Q	STRATUS COMPUTER	41	15	21.75	2.00	10.13
Q	SUN MICROSYSTEM INC	46	14	30.50	2.75	9.91
Q	SYM8OLICS INC	6	1	1.56	-0.06	-3.82
N	TANOEM COMPUTERS INC	38	17	23.63	-0.25	-1.05
N	TANOY CORP	57	31	35.38	1.88	5.60
N	ULTIMATE CORP	37	16	20.50	0.00	0.00
N	UNISYS CORP	48	24	31.50	0.50	1.61
A	WANG LA8S INC	19	10	11.13	0.50	4.71

Software & DP Services

EXCH		52-WEEK RANGE (1)		CLOSE NOV. 25 1987	WEEK NET CHNGE	WEEK PCT CHNGE
Q	AOVANCEO COMP TECH	6	3	3.13	-0.38	-10.71
N	AOVANCEO SYS INC	35	15	24.25	-0.25	-1.02
N	AGS COMPUTERS INC	30	11	15.50	0.75	5.08
Q	AMERICAN MGMT SYS INC	20	9	11.63	0.00	0.00
Q	AMERICAN SOFTWARE INC	22	6	8.50	-0.13	-1.45
N	ANACOMP INC	11	4	5.50	0.00	0.00
Q	ANALYSTS INTL CORP	10	4	6.25	0.00	0.00
Q	ASHTON TATE	33	13	18.75	0.50	2.74
Q	ASK COMPUTER SYS INC	17	6	8.38	-0.13	-1.47
Q	AUTOOESK INC	34	12	17.50	1.50	9.38
N	AUTO OATA PROCESSING	55	16	43.75	2.75	6.71
Q	8OOLE & 8A88AGE INC	12	5	6.50	-0.38	-5.45
N	COMPUTER ASSOC INTL INC	37	13	25.63	1.25	5.13
Q	COMPUTER HORIZONS CORP	15	8	8.75	-0.25	-2.78
N	COMPUTER SCIENCES CORP	73	40	49.25	3.25	7.07
N	COMPUTER TASK GROUP INC	18	9	10.13	-0.13	-1.22
Q	COMSHARE INC	28	12	13.00	-1.50	-10.34
N	CULLINET SOFTWARE INC	14	5	6.13	-0.25	-3.92
Q	CYCARE SYS INC	10	6	6.00	-0.13	-2.04
Q	OUQUESNE SYS INC	33	10	15.00	0.00	0.00
Q	ENOATA INC	16	6	0.00	0.00	0.00
N	GENERAL MTRS (CLS E)	51	24	34.75	0.75	2.21
Q	HOGAN SYS INC	17	5	5.75	-0.25	-4.17
Q	INFORMIX CORP	31	10	19.00	0.63	3.40
Q	INTELLICORP INC	11	3	3.75	0.00	0.00
Q	KEANE INC	10	5	6.00	0.50	9.09
Q	LOTUS OEV CORP	40	16	26.25	2.75	11.70
Q	MANAGEMENT SCI AMER	21	7	6.88	-0.50	-6.78
Q	MICRO PRO INTL CORP	8	2	4.06	-0.13	-2.98
Q	MICROSOFT CORP	79	23	47.50	1.25	2.70
Q	NATIONAL OATA CORP	34	19	22.00	-0.50	-2.22
Q	ON LINE SOFTWARE INTL INC	22	9	9.50	-1.25	-11.63
Q	ORACLE SYS CORP	38	9	22.00	1.50	7.32
N	PANSOPHIC SYS INC	28	11	13.88	0.13	0.91
Q	POLICY MGMT SYS CORP	30	15	18.00	0.25	1.41
Q	PROGRAMMING & SYS INC	14	8	7.88	-0.13	-1.56
Q	REYNOLOS & REYNOLOS CO	39	15	16.00	-0.25	-1.54
Q	SEI CORP	18	9	13.50	-0.50	-3.57
Q	SHAREO MEO SYS CORP	53	19	21.38	0.13	0.59
Q	SOFTWARE AG SYSTEMS INC	19	9	9.63	0.25	2.67
Q	SOFTWARE PU8G CORP	17	5	7.00	0.25	3.70
A	STERLING SOFTWARE INC	15	6	8.13	-0.25	-2.99
Q	SUNGARD OATA SYS INC	21	10	11.13	-0.63	-5.32
Q	SYSTEMATICS INC	30	17	24.50	0.50	2.08
N	SYS. SOFT INC.	24	7	10	-0.13	-1.27
Q	VM SOFTWARE INC	45	9	9.00	-0.13	-1.37

Semiconductors

EXCH		52-WEEK RANGE (1)		CLOSE NOV. 25 1987	WEEK NET CHNGE	WEEK PCT CHNGE
N	AOV MICRO DEVICES INC	25	9	10.00	0.13	1.27
N	ANALOG DEVICES INC	24	9	10.00	0.00	0.00
Q	ANALOGIC CORP	13	6	7.50	-0.13	-1.64
Q	INTEL CORP	42	14	24.00	2.38	10.98
Q	LSI LOGIC CORP	17	7	7.75	0.50	6.90
N	MOTOROLA INC	74	35	44.75	4.00	9.82
N	NATL SEMICON OUCTOR	22	10	12.50	0.75	6.38
N	TEXAS INSTRS INC	80	36	44.88	5.38	13.61
A	WESTERN OIGITAL CORP	33	12	13.25	0.38	2.91

Peripherals

EXCH		52-WEEK RANGE (1)		CLOSE NOV. 25 1987	WEEK NET CHNGE	WEEK PCT CHNGE
Q	ALLOY COMP.	12.75	4.5	6.75	0.25	3.85
N	AM INTL INC	9	3	4.63	-0.75	-13.95
Q	AST RESH INC	23	6	7.25	0.50	7.41
Q	AUTO TROL TECH CORP	9	3	4.00	0.25	6.67
Q	8ANCTEC INC	16	6	6.25	-0.13	-1.96
Q	CIPHER OATA PROOS INC	18	4	5.63	0.38	7.14
A	COGNITRONICS CORP	5	2	2.50	0.00	0.00
N	COMPUGRAPHIC CORP	28	19	20.75	-0.25	-1.19
N	COMPUTERVISION CORP	23	7	8.25	0.50	6.45
A	OATAPRODUCTS CORP	24	7	7.88	0.25	3.28
A	OATARAM CORP	9	6	6.38	0.00	0.00
N	DECISION INOS CORP	13	4	8.63	0.88	11.29
N	EASTMAN KODAK CO	71	42	48.13	0.75	1.58
Q	E M C CORP MASS	29	10	14.00	-0.50	-3.45
Q	EMULEX CORP	10	4	4.50	0.50	12.50
Q	EVANS & SUTHERLANO	40	18	20.50	0.75	3.80
Q	ICOT CORP	13	3	4.00	-0.13	-3.03
Q	INTERLEAF INC	24	9	14.88	1.38	10.19
Q	IOMEGA CORP	8	1	1.63	0.00	0.00
Q	LEE OATA CORP	10	3	3.13	0.00	0.00
Q	MASSTOR SYS CORP	6	1	1.75	0.00	0.00
Q	MAXTOR CORP	34	6	8.50	1.75	25.93
Q	MICROPOLIS CORP	44	13	18.50	0.00	0.00
Q	MINISCRI8E CORP	18	5	6.88	0.25	3.77
N	MINNESOTA MNG & MFG CO	84	45	64.25	2.75	4.47
A	MSI OATA CORP	24	11	15.25	0.25	1.67
Q	PRIAM CORP	6	1	1.56	-0.06	-3.82
Q	PRINTRONIX INC	13	8	8.00	0.00	0.00
N	QMS INC	27	12	13.88	0.88	6.73
Q	QUANTUM CORP	35	8	9.75	0.13	1.30
Q	RAMTEK CORP	6	2	3.25	0.38	13.04
N	RECOGNITION EQUIP INC	27	7	8.38	-0.50	-5.63
Q	REXON INC	14	5	5.13	0.00	0.00
Q	SCAN TRON CORP	17	7	9.50	-0.25	-2.56
Q	SEAGATE TECHNOLOGY	46	10	12.50	0.00	0.00
N	STORAGE TECH CORP	5	1	1.25	0.00	0.00
Q	TANOON CORP	7	2	1.94	-0.06	-3.10
A	TEC INC	7	3	4.25	-0.25	-5.56
N	TEKTRONIX INC	43	25	26.38	0.50	1.93
Q	TELEVIOEO SYS INC	3	1	1.31	-0.19	-12.47
N	TELEX CORP	102	30	49.00	1.25	2.62
Q	WYSE TECH	40	11	18.50	0.75	4.23
N	XEROX CORP	85	50	56.50	-0.38	-0.66
Q	XIOEX CORP	16	6	6.25	0.25	4.17

Leasing Companies

EXCH		52-WEEK RANGE (1)		CLOSE NOV. 25 1987	WEEK NET CHNGE	WEEK PCT CHNGE
Q	CAPITAL ASSOCIATES INTERNATIONAL INC	10	4	4.25	0.25	6.25
N	COMOISCO INC	37	12	17.13	0.00	0.00
N	CONTINENTAL INFO SYS	14	6	6.63	0.25	3.92
Q	PHOENIX AMERN INC	8	3	3.00	0.25	9.09
Q	SELECTERM INC	6	4	3.88	-0.13	-3.13

EXCH: N = NEW YORK; A = AMERICAN; Q = NATIONAL;
O = OVER-THE-COUNTER; S = SPLIT

O-T-C PRICES ARE 8I0 PRICES AS OF 3 P.M. OR LAST 8I0
(1) TO NEAREST OOLLAR

One giant leap

Space contract fuels Apollo; most tech stocks stuck in orbit

Although most computer stocks remained sluggish despite Tuesday's market surge, Apollo Computer, Inc. rose sharply on some of its own good news — from outer space.

Apollo jumped 1⅞ points to 11⅝ in heavy trading after announcing two contracts from Lockheed Corp. to use Apollo workstations in Lockheed-designed space stations. The contracts were estimated at a total of $6.5 million to $10.5 million. Combined with Monday's gain, Apollo was up 2⅜ points, or 26%, in two days. Attempting to rebound from the market crash and some financial setbacks, Apollo had been hovering near its 1987 low of 8⅝.

Most computer issues posted only modest gains Tuesday despite encouraging news on the federal budget deficit. Among the better performers were Apollo rival Sun Microsystems, Inc., up 1¼ points to 30½; Lotus Development Corp., up 1¼ to 26¼; Digital Equipment Corp., up 3⅞ to 128¼; and Amdahl Corp., up 1½ to 31⅜.

IBM rose just one point, to 118½, gaining three quarters of a point in the two days. Apple Computer, Inc. gained 1½ points in the two sessions, climbing to 37.

CLINTON WILDER

IBM cooking up 1.25G-byte magnetic disks

BY JAMES A. MARTIN
CW STAFF

SAN JOSE, Calif. — IBM's Almaden Research Center has announced the development of 3½-in. magnetic hard disks capable of holding 1.25G bytes of data, or 50 times more than today's highest density hard disks.

The announcement is considered a breakthrough in magnetic disk technology, bringing capabilities that rival those promised by emerging optical disk technology.

"It shows there's a lot of life left in magnetic disks and that they can be a formidable competitor to optical," said David P. Vellante, director of the storage products market program at International Data Corp. in Framingham, Mass.

But IBM's technology will not be on the market for possibly 10 years, according to analysts, so there is no immediate threat to optical disks. In addition, some optical storage capacities currently being tested in laboratories are approaching the 1.5G-byte level, according to Dick Zech, senior optical disk drive industry analyst for Rothchild Consultants in San Francisco.

"Ten years from now, optical will probably offer two billion bits of storage per square inch," Zech added. "Optical is not going to sit still."

Magnetic disk drives, which are the primary hard-disk medium today, store information in bit cells similar to record grooves. IBM said its scientists recorded, read and erased bit cells measuring only 0.5 by 0.5 microns.

IBM's technology etches the 0.5 micron-wide tracks onto a magnetic disk using a photolithographic beam and semiconductor fabrication techniques.

Although the disk has been developed, IBM said there is no recording head that can fully take advantage of the density. "There needs to be an equally significant advance in recording head technology for this to be truly useful," said Jon Iwata, an IBM spokesman at the research center. "We need a recording head of equal smallness to pack the data close together."

LAN 1-2-3

CONTINUED FROM PAGE 1

at local workstations, according to Lotus. The product has the ability to lock work sheet files so that only one user at a time can work with a file while the other four can view it.

Users can combine as many incremental packages of 1-2-3 Networker as they want, according to Rob Perry, marketing manager for Lotus's networking products.

The program has a suggested retail price of $2,475. Lotus announced an exchange program, however, that allows users to buy the product in exchange for five stand-alone versions of 1-2-3 Release 2.0 for an additional $250.

Users and analysts met the product's long-awaited delivery with skepticism, with most comments centering on its high price and ability to support only five users.

"If I could serve my whole network at that price, that would be reasonable," said Tom Wilkinson, an MIS manager with Templeton Investment Council, Inc. "But if I have to buy four packages, that's quite expensive."

"It is priced a bit on the high side. What they are telling me is that on a per-user basis, it's not much of a benefit over the single-user price," said Larry Stouder, manager of Continental Grain Co.'s information center.

The average local-area network today supports from eight to 15 users. Analysts noted that 1-2-3 Networker's support of only five users is well below average.

"The problem here is that networks are growing in size. It shows me that Lotus is not in touch with what the market really wants," said John McCarthy, director of professional automation service for Forrester Research, Inc.

Price no object for some

Lotus's Perry said he does not think the program's price is too high. He claimed users will obtain a "significant savings" through concurrent use of the product over a network.

"The price is an opportunity for retailers to [set] prices based on their margins and to recoup some of their support costs for dealing in a network environment, which is more complex," Perry said.

The 1-2-3 Networker package does not represent Lotus's "ultimate solution" to 1-2-3 users' networking needs. However, Perry said, it represents an important first step for the company into the LAN market. "We have been building up expertise and learning what issues are important to the network market, and this process continues with this product," Perry said.

The extended delay in delivering the product centered on how to get around the problems copy protection imposes, according to Perry. After much consultation with customers, Lotus finally decided its approach would compromise the needs of users and changed its original plan.

Besides file-locking capabilities, 1-2-3 Networker permits users to print directly to compatible network-shared printers and plotters. It comes with a set of program disks, an installation and configuration manual and five sets of documentation.

The program runs on popular networks, including IBM's PC LAN Program 1.1 with IBM's PC Network or Token-Ring adapters; 3Com Corp.'s 3+ 1.1 with Etherlink network adapters; and Novell, Inc.'s SFT Netware 286 2.1 or Banyan Systems, Inc.'s Vines 2.1, both with Etherlink adapters. It works with IBM's Personal System/2s and Personal Computers and compatibles. A 5¼-in. disk drive is required to do the initial installation of the program, Lotus said.

Second-class postage paid at Framingham, Mass., and additional mailing offices.
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Info managers creating promise, confusion

BY DOUGLAS BARNEY
CW STAFF

Step aside, desktop publishing. Here come information managers. Or so many enthusiastic observers are forecasting as this new class of software hits the corporate desk top.

While the packages differ dramatically in approach and functionality, all have the ability to store data in an unstructured fashion and allow users to search for data using intuitive queries.

User confusion still lingers about the benefits of these products, but many analysts said they believe the software will eventually catch on and demand will grow dramatically.

"Move over, desktop publishing," said Amy Wohl, president of Wohl Associates. Jeff Tarter, publisher of "Softletter," said information managers will likely become a major new category of software.

Among the information managers now shipping are Dayflo from Dayflo Software Corp., Guide from Owl International, Inc., Memorymate from Broderbund Software, Inc., Info-XL from Valor Software and Hypercard from Apple Computer, Inc. Products that have been announced but have yet to ship include Ize from Persoft, Inc. and Agenda from Lotus Development Corp.

No instant hits

So far, none of the current packages have jumped onto the best-seller lists. And even the most advanced packages, such as Agenda, which is set to ship next year, have some users scratching their heads.

"I saw Agenda and couldn't see that we would have that much use for it," said Frances Medelsohn, information center manager for the U.S. Food and Drug Administration. "I was not exactly bowled over."

But users of the packages who were interviewed last week gave the new category a thumbs-up.

"It lets me write things down and find them in a way that is more compatible with the way I think. I put information in a disconnected form and find it again," said Roy Freborg, a computer consulant in Rohnert Park, Calif., who is beta-testing Persoft's Ize.

For individual users, the products should become more valuable in the future, as multitasking becomes the norm rather than the exception.

In a multitasking environment, for example, users could easily invoke an information manager from a word processor and paste in parts of a document. For now, users must go through the awkward process of exiting a current application to load the information manager.

Rebirth

Information managers are not entirely new. Dayflo Software shipped its Dayflo free-form data base in early 1984. The product failed, though, because of its complexity and demands on hardware.

Dayflo has revamped the product and is now going after what it calls the "information tracking market."

There are various categories of information management software. Products such as Gofer from Microlytics, Inc. simply allow users to search through text, looking for a key word or string of words. Free-form data base products such as Asksam from Seaside Software, Inc. and Dayflo allow for the categorization of text according to a variety of criteria.

Products such as Hypercard and Guide are essentially hypertext, a technology that allows different pieces of text to be linked together at the user's discretion.

Products such as Ize and Agenda include some hypertext features but add the ability for the system to determine how text should be linked.

Meet Arthur Young

In addition to ad hoc queries of text, the products can be used to develop specific applications. Using Apple's Hypercard, accounting firm Arthur Young has developed a system that lets job applicants "go through an introduction to our firm" prior to an interview, according to Rick Richardson, the firm's national director of microcomputer technology.

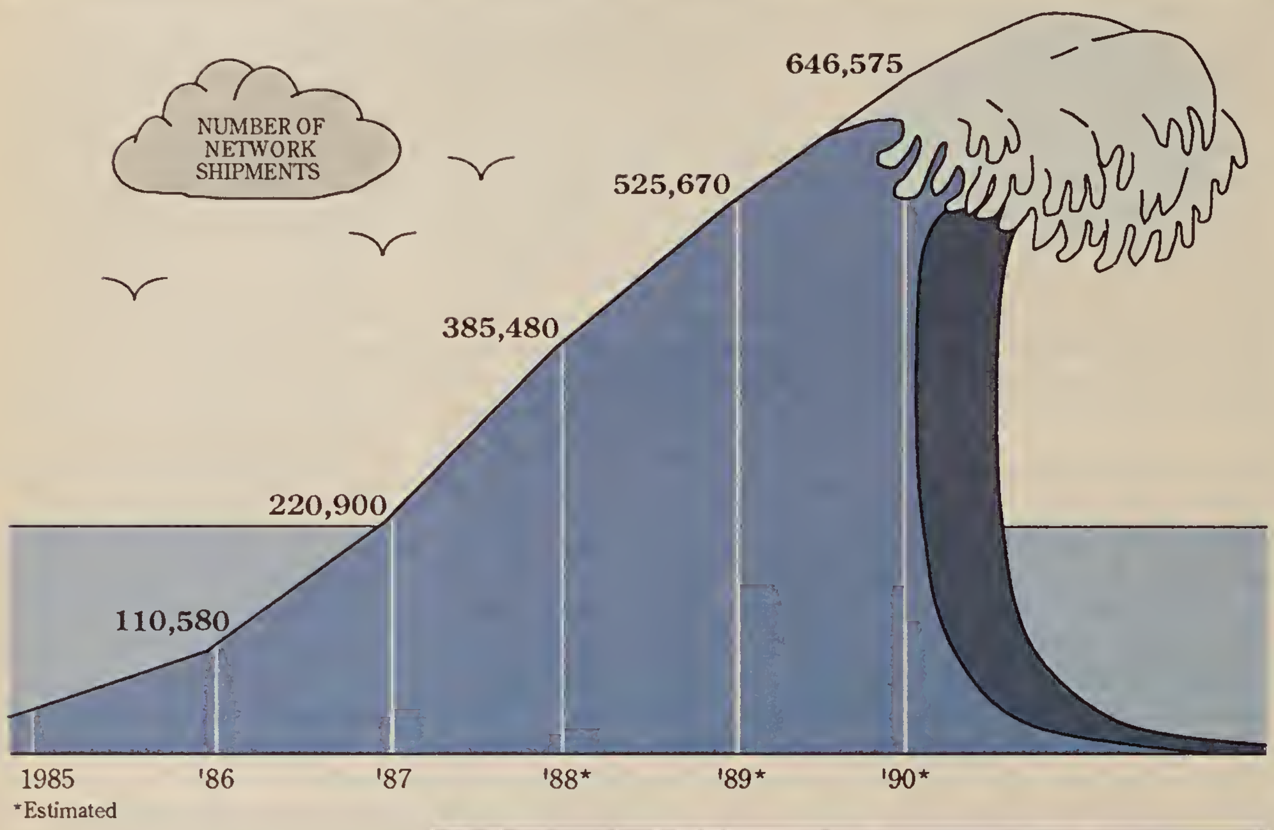
Another user has gone even further. "We have an interactive videodisk teaching lab for medical students and now have their entire syllabus and transcript system on-line," said Dr. Steven M. Erde, technical director of the Pathmac Laboratory of Cornell University Medical College's department of pathology. "We are using Guide to interface with the videodisk and color digital pictures."

The products can also be used as a front end to large data bases on magnetic storage media or compact disk/read-only memory (CD-ROM). "We are looking at taking our audit manual and Securities and Exchange Commission regulations and porting them to a Hypercard application that will probably be CD-ROM-based," Richardson said.

TRENDS

PC local-area networks

Wave of network unit shipments expected



The number of personal computers attached to networks will skyrocket during the next two years, encompassing almost 50% of the installed PC base by 1990, according to International Data Corp. (IDC), a market research firm in Framingham, Mass.

A key factor behind the connectivity stampede will undoubtedly be IBM and Microsoft Corp.'s OS/2, which will provide developers with a platform for distributed applications. Users today complain that they are hampered by a lack of good network applications.

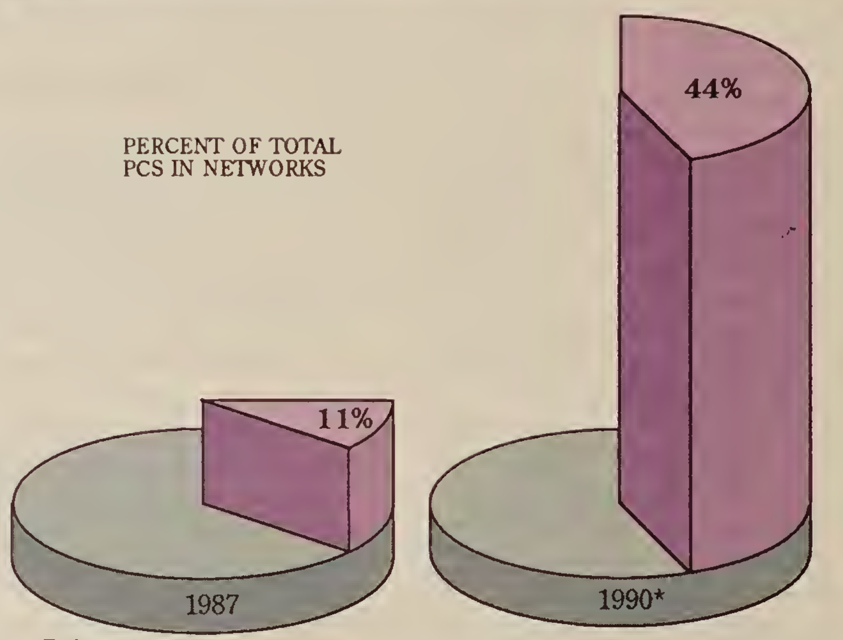
Many users are waiting for vendors of popular single-user applications to port their programs to a multiuser environment. Some of the applications are only now becoming available. For example, Lotus Development Corp.'s 1-2-3 Networker will ship in two weeks (see story page 1).

Also helping drive the rush to tie in and turn on is the steady, continuing drop in the average price per PC connection. Although cheaper connections are available, IDC pegs the average price per node today at $500. By 1990, IDC predicts, prices will drop to $325, bottoming out at $275 two years later.

Other factors contributing to the rise in networked PCs include the rapidly dropping cost of personal computers and add-on memory.

PATRICIA KEEFE

Existing PCs will be added to networks



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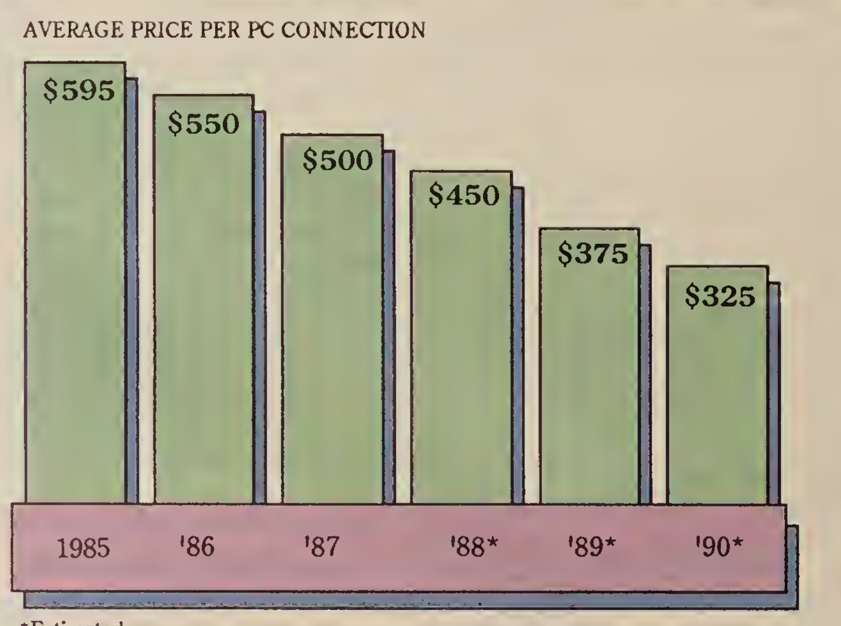
Price per network connection to fall



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INFORMATION PROVIDED BY INTERNATIONAL DATA CORP.
CW CHARTS: AMY J. SWANSON

INSIDE LINES

Put a hold on that check. Some software developers are becoming increasingly irked at the $3,000 they shelled out for Microsoft's Software Development Kit for OS/2. It seems that an update was due in August and has not arrived yet. Another reason to pay the big bucks was that it gave some developers a chance to play with the operating system and test for compatibility and hardware requirements. With IBM set to ship early next month, maybe it wasn't such a great head start.

Big Blue lawyers in sight? Who will be first with a PS/2 Micro Channel compatible? Some say Acer Technologies, formerly known as Multitech Electronics, will introduce compatibles to the AT bus-based PS/2 Model 30 and Micro Channel-based Model 50 as early as March. Acer President Stephen R. McKenzie, however, said last week that "if that happens, I will be the most surprised." He said Acer might have a Model 30 compatible out by Comdex/Spring '88 but that technical and legal considerations would prevent a Micro Channel compatible from appearing before fall.

Where angels fear to tread. Phil Hinderaker, president of Dataserv Computer Maintenance, Inc. in Minneapolis, confirmed that maintenance companies are looking into the possibility of antitrust action against IBM because of its recent parts availability policy changes. Hinderaker said his understanding of the requirements of the Department of Justice's consent decree concerning IBM's business practices is that third parties' access to parts must be equal to that of an IBM customer engineer. With the change in policy that parts are only available from 20 regional centers and not from the more than 100 IBM branch locations, access is not the same, he said. But Hinderaker is not optimistic about the chances of legal action anytime soon. "We need to come to a clearer understanding of IBM's intent; whether it's to cut their own costs or to hurt competition," he said.

And he'll make sure taxes are collected, too. The town of Westboro, Mass., had been selected as one of 12 sites nationwide for Sematech, the government-private consortium that will throw $1.5 billion into the U.S. semiconductor effort. But the commonwealth and its presidential hopeful, Gov. Michael Dukakis, may fall victim to their own successes in the high-tech world. It seems consortium members are taking a hard look at the high cost of housing in the area — among the highest in the country due largely to the mostly thriving computer businesses in the area — and wonder just how much they'll have to pay to get good help.

Behind this curtain. Compaq desktop PCs may not look like it, but they are carrying CDC 3½-in. hard disk drives in their chassis. The drives were announced in October. "Compaq is one of CDC's largest customers," said Larry Perlman, CDC executive vice-president and president of the company's Data Storage Products Group. In the last two years, Perlman said, CDC has been moving more of its production of small fixed disk drives offshore and has been turning them out in high quantities to compete with West Coast suppliers Micropolis and Seagate. This year, CDC expects to sell $1 billion worth of disk drives and peripherals, nearly half of it in 5¼- and 3½-in. drives.

White knight. Decision Industries, the parent company of IBM System/36- and 38-compatible peripherals maker Decision Data, has apparently beaten back the hostile takeover attempt of computer leasing firm Econocom International N.V. [CW, Nov. 2]. The Horsham, Pa., firm agreed last week to be acquired by Onset Corp., a new venture capital firm principally backed by J. H. Whitney & Co. and Welsh, Carson, Anderson & Stowe in New York for $8.75 a share, or about $82.4 million. The offer exceeds the recently sweetened $7-a-share proposal from Econocom, which earlier this month held 23% of Decision Industries' shares. Onset's tender offer for 100% of Decision Industries' shares takes effect today. Econocom's U.S. subsidiary did not respond to queries by press time. Decision Industries, which had $195 million in revenue last year, is also the parent of Decision Data Service Corp. and two subsidiaries that sell turnkey systems to the beverage and restaurant businesses.

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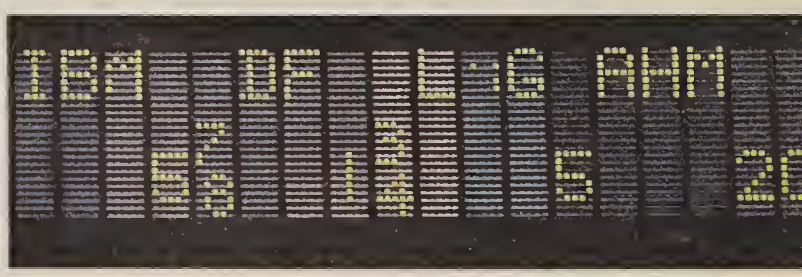

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